











CATALOGUE  
OF  
SCIENTIFIC PAPERS  
1800—1900

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SUBJECT INDEX

VOLUME II

MECHANICS

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ROYAL SOCIETY OF LONDON

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VOLUME II

MECHANICS

CAMBRIDGE :  
AT THE UNIVERSITY PRESS

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ARRANGED FOR A COMMITTEE OF THE ROYAL SOCIETY  
UNDER THE SUPERINTENDENCE OF

HERBERT M<sup>C</sup>LEOD, LL.D., F.R.S.

DIRECTOR OF THE CATALOGUE

with the assistance of

R. J. DALLAS, M.A.

KING'S COLLEGE, CAMBRIDGE

## PREFACE

IN the Preface to the volume forming the Subject Index to the papers on Pure Mathematics for the nineteenth century, published in 1908, an outline of the history of the Royal Society's Catalogue of Scientific Papers is given; it is not necessary to repeat that account.

The present volume deals with the papers on Mechanics as classified in the Schedules of the International Catalogue of Scientific Literature; it contains 21295 entries referring to the papers contained in 959 serial publications.

The Index titles for papers published in the latter part of the century, from 1884 to 1900 inclusive, have been made by Referees familiar with the subjects, who have consulted the original papers and have made the titles from the contents of the papers and not merely from their headings. It was intended that the Index entries for the papers from 1800 to 1883 should be made from the complete titles as printed in the Catalogue of Authors already published; but it was soon found that many of these titles were too indefinite for such minute classification, and reference has had to be made to the original papers in a large number of cases.

The subjects are arranged under the registration numbers adopted in the International Catalogue of Scientific Literature; a copy of Schedule B (Mechanics) of that Catalogue, is prefixed to the Index, with indication of the pages on which the titles for the different sections occur. It has occasionally been found convenient, in order to save repetition in printing, to group entries under a sub-heading which is not contained in the International Catalogue Schedule. Where this has been done the sub-heading is printed in italics. In some of these cases the words of the sub-heading are understood to exist before the entries following them, and consequently these entries commence with small letters. These minor classifications, being often made mechanically on the basis of the explicit mention of the sub-heading, are not to be taken as exhaustive; cognate entries may be found elsewhere under the same main heading. The unit of classification is thus the complete numbered heading.



## Preface

The entries in the Index are arranged so that reference can be made, if necessary, to the complete titles in the Catalogue of Scientific Papers. Generally the author's name together with the date will indicate the volume in which the title of the paper may be found in full. But these clues are insufficient when the paper is anonymous, or occurs in Volume XII or in the additions to Volume VI. They are also at fault for titles marked with an asterisk showing that they belong to previous volumes; in these cases the number of the volume is given in the Index entry in small Roman numerals within brackets. The references have been made as short as possible: thus the number of only the initial page of each paper has been given; but the length of the paper may be found by reference to the Catalogue of Authors.

When an error has been found in an author's name in the Catalogue, it is corrected in the Index and a reference made to the error.

The Index contains references to some papers, of dates earlier than 1884, which were omitted in previous volumes of the Catalogue: these are indicated by an asterisk placed before the date; the full titles of these papers will be given in the continuation of the Catalogue of Authors.

When an author's personal name does not appear in the original heading of a paper, no attempt has been made to find the name for the Index; but this will be done for the Catalogue of Authors.

Entries on the same subject are arranged, so far as possible, in order of date irrespective of the authors' names, with the endeavour to present the subject in the historical form. This grouping of the entries, involving modifications of titles prepared by different Referees, or by the same Referee at different times, has been one of the most difficult problems in the preparation of the Index.

The abbreviations used in the Royal Society Catalogue for the names of the serials have been further shortened for the Index. As the abbreviations are not uniform in all the volumes, it will be found that the same journal may be indicated by several different abbreviations, but in each case the one selected is that which was used in the volume in which the title of the paper occurs.

In the case of serials commencing since 1883, the abbreviations adopted in the International Catalogue have been used as a guide.

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The list of serials will, as in the case of Pure Mathematics, be a valuable feature of the Index. It has been drawn up by the Director, and contains the names of 959 serials from which the entries in the Index have been taken. Each title is preceded by the abbreviation which represents the serial in the Index; the date of commencement of the serial is given, and if it is extinct the date of the last volume is added. There are appended symbols representing the names of twenty-eight British Libraries in some of which the serials may be found; where the set is incomplete the symbol is followed by *i*. The information from which this list has been compiled was obtained, in the first instance, from published catalogues; subsequently the list was submitted to the custodians of many of the libraries, who kindly marked many serials which had not been found in the catalogues used. The thanks of the Committee for this valuable assistance are due to Mr F. Jenkinson of the Cambridge University Library, Mr E. W. B. Nicholson of the Bodleian Library, the Librarian of the Radcliffe Library, the Librarian of the Cambridge Philosophical Society, Mr F. W. Clifford of the Chemical Society, to Mr R. Lloyd Praeger for obtaining information from the five libraries in Dublin, Mr J. Hardy of the Royal Society of Edinburgh, Mr C. V. Crook of the Geological Museum, Mr Rupert Jones of the Geological Society, Mr J. Knight of the Royal Philosophical Society, Glasgow, Mr J. L. Galbraith of the University, Glasgow, Dr J. H. T. Tudsbery of the Institution of Civil Engineers, Dr B. Daydon Jackson and Mr A. W. Kappel of the Linnean Society, the Librarian of the London Mathematical Society, Mr J. W. Knapman of the Pharmaceutical Society, Mr E. W. Hulme of the Patent Office Library, Mr W. H. Wesley of the Royal Astronomical Society, Mr F. Allen of the Royal Geographical Society, Mr R. W. Chambers of University College, London, and Mr L. W. Fulcher of the Science Library, Science Museum, South Kensington.

Although much care has been expended in making this list as accurate as possible, it is probable that some errors will still be found, and the Director will be thankful to any one who will send corrections: portions of the list will be required for the subsequent volumes of the Index.

The following Referees have assisted at various times in the preparation of the Subject Index in Mechanics: Miss Alice Everett, Miss W. M. Hudson, Miss E. Perrin, Mr R. J. Dallas, Mr A. T. Goodfellow, Mr R. Hargreaves, Mr H. Knapman, Dr R. A. Lehfeldt, Dr Max von May, Dr W. Marshall Watts,

## Preface

and Mr G. Harold Wilson. The Committee is indebted to them for much valuable help.

The arrangement of the contents of this volume for the press has been made by Mr R. J. Dallas, M.A., of King's College, Cambridge. To him, and to Miss Bremner and the other members of the Catalogue Staff of the Royal Society, thanks are due for careful and conscientious work. Mr G. B. Mathews, F.R.S., a member of the Committee in charge of the Catalogue, and the officers of the Royal Society, have given help from time to time about questions of arrangement.

The material for the Index volume for Physics is already in an advanced state of preparation; this is largely owing to the interest which Dr Ludwig Mond, F.R.S., has continued to take in the work, and the increased subsidy by which he has most generously made acceleration possible.

The Catalogue of Scientific Papers arranged under Authors, for the period 1884 to 1900, is in preparation; the material will not however be quite complete until the Subject Indexes for the various Sciences have been reduced to order.

The Syndics of the Cambridge University Press have undertaken the complete risk of printing and publishing, as regards both the Catalogue of Scientific Papers and the Subject Index. It will be the care of the Committee, and it is hoped of the Scientific world generally, to use their best endeavours that this public-spirited action shall not result in financial loss.

The thanks of the Committee are due to the officials of the Cambridge Press for their unfailing courtesy in the discharge of a complex task.

*November, 1909.*

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## SUBJECT INDEX OF MECHANICS

### LIST OF SERIAL PUBLICATIONS

WITH THE ABBREVIATIONS OF THEIR TITLES USED IN THE INDEX, AND  
LIBRARIES WHERE THE SERIALS CAN BE CONSULTED.

The date following the title of a serial indicates the year of its commencement; if a second date is given it marks the termination of the serial.

The letters following the dates indicate libraries where the serials are to be found: if the serial is incomplete, the symbol of the library is followed by *i*.

B.M.	British Museum.	Glasg.U.	Glasgow University.
Camb.P.S.	Cambridge Philosophical Library.	I.CE.	Institution of Civil Engineers, London.
Camb.U.	Cambridge University Library.	Linn.S.	Linnean Society.
Chem.S.	Chemical Society.	Math.S.	Mathematical Society.
Dub.N.L.I.	National Library of Ireland, Dublin.	N.H.M.	Natural History Museum.
Dub.R.C.S.	Royal College of Science, Dublin.	Oxon.B.	Bodleian, Oxford.
Dub.R.D.S.	Royal Dublin Society.	Oxon.B.(R.)	Deposited in Radcliffe.
Dub.R.I.A.	Royal Irish Academy, Dublin.	Oxon.R.	Radcliffe, Oxford.
Dub.T.C.	Trinity College, Dublin.	Pharm.S.	Pharmaceutical Society, London.
Edinb.R.S.	Royal Society of Edinburgh.	P.O.	Patent Office, London.
Edinb.U.	Edinburgh University. ( <i>Information incomplete.</i> )	R.A.S.	Royal Astronomical Society.
Geol.M.	Geological Survey Museum, Jer- myn St.	R.Geogr.S.	Royal Geographical Society.
Geol.S.	Geological Society.	R.S.	Royal Society.
Glasg.P.S.	Royal Philosophical Society of Glasgow.	S.K.	Science Museum Library, South Kensington.
		U.C.L.	University College, London.

  

<b>A. Agn.</b> .....	Annales Agronomiques...Paris. 1851; 1875— B.M.; Chem.S.i.; Linn.S.; Oxon.B.; P.O.i.; R.S.i.
<b>Aarau Arch. Md.</b> .....	Archiv der Medizin, Chirurgie, und Pharmacie. Aarau. 1816—17. R.S.
<b>Aarau Mt.</b> .....	Mittheilungen der Aargauischen Naturforschenden Gesellschaft. Aarau. 1878— N.H.M.; R.S.; S.K.
<b>A. C.</b> .....	Annales de Chimie, ou Recueil de Mémoires concernant la Chimie et les Arts qui en dépendent. Paris. 1789— B.M.; Camb.U.; Chem.S.; Dub.R.D.S.i.; Dub.T.C.i.; Edinb.R.S.; Edinb.U.; Glasg.U.; I.CE.; N.H.M.; Oxon.B.i.(R.); Pharm.S.; P.O.; R.S.; S.K.; U.C.L.
<b>A. C. Anal.</b> .....	Annales de Chimie Analytique appliquée à l'Industrie, à l'Agricul- ture, à la Pharmacie et à la Biologie. Paris. 1896— Chem.S.i.; P.O.
<b>Ac. Cæs. Leop. N. Acta</b> ...	Nova Acta physico-medica Academicæ Cæs. Leopoldino-Carolinæ Naturæ Curiosorum. Erlangen, Bonn, Breslau. 1759— Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.; Edinb.R.S.i.; Edinb.U.; Geol.S.i.; Glasg.U.; Linn.S.i.; N.H.M.; Oxon.R.; Pharm.S.i.; R.A.S.i.; R.S.; S.K.i.; U.C.L.i.
<b>Acireale Ac. At.</b> .....	See <b>Ac. Nt. C. N. Acta</b> and <b>Cæs. Leop. Ac. N. Acta.</b> Atti e Rendiconti dell' Accademia di Scienze, Lettere e Arti dei Zelanti e PP. dello Studio di Acireale. Acireale. 1890— Camb.P.S.i.; Geol.S.i.; N.H.M.i.; R.S.i.



## List of Serial Publications

- Ac. Nt. C. N. Acta** ..... See **Ac. Cas. Leop. N. Acta** and **Cas. Leop. Ac. N. Acta**.  
**A. Cond. Pon. Chauss.** ... Annales des Conducteurs des Ponts et Chaussées; recueil de mémoires, etc., concernant le Service de Conducteurs des Ponts et Chaussées. Paris.  
 1857— I.CE.i.; P.O.  
**A. Cons. Arts et Mét.** ... Annales du Conservatoire des Arts et Métiers. Paris.  
 1861— B.M.; Camb.U.; Glasg.P.S.i.; I.CE.i.; Oxon.B.; P.O.; R.S.; S.K.i.  
 See **Par. A. Cons.**  
**A. C. Phm.** ... Annales der Chemie und Pharmacie. Lemgo, Leipzig, Heidelberg.  
 1832— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.; Edinb.R.S.i.; Glasg.P.S.; Glasg.U.i.; N.H.M.; Oxon.R.; Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.  
 See **Lieb. A.**  
**Acta Mth.**..... Acta Mathematica. Stockholm.  
 1882— B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Glasg.U.; Math.S.; Oxon.R.; R.A.S.; R.S.; U.C.L.  
**Act. S. Helv.** ..... Actes de la Société Helvétique des Sciences Naturelles. Lausanne, etc.  
 1825— B.M.i.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; S.K.  
 See **At. S. Elvet., Sch. Gs. Vh. and Sch. Nf. Gs. Vh.**  
**A. das Sc.** ..... Annaes das Sciencias, etc. por huma Sociedade de Portuguezes residentes em Paris. Paris.  
 1818—27. B.M.; Camb.U.i.  
 See **Par. A. das Sc.**  
**Adelaide Ph. S. T.** ..... Adelaide Philosophical Society. Annual Reports and Transactions. Adelaide.  
 1865—79. B.M.i.; Edinb.R.S.i.; I.CE.i.; Linn.S.; N.H.M.i.; R.A.S.i.; R.S.i.  
**A. der Hydrog.** ..... Annalen der Hydrographie und Maritimen Meteorologie. Herausgegeben von der Deutschen Seewarte in Hamburg. Berlin.  
 1875— *Continuation of:* Hydrographische Mittheilungen, 1873—74. B.M.; P.O.i.; R.Geogr.S.  
**A. di C.** ..... Annali di Chimica. Milano.  
 1845—97. *Continued as:* Annali di Farmacoterapia e Chimica, 1898— B.M.; Camb.U.i.; Chem.S.i.; P.O.i.  
**A. d'Ocul.** ..... Annales d'Oculistique. Charlevoix, Bruxelles, Paris.  
 1838— B.M.; Camb.U.i.; Oxon.R.i.  
**Aér.** ..... L'Aéronaute. Bulletin Mensuel Illustré de la Navigation Aérienne. Paris.  
 1868— B.M.i.; P.O.; S.K.  
**Aer. J.** ..... The Aeronautical Journal. London.  
 1897— B.M.; Camb.U.i.; I.CE.i.; P.O.; R.S.; S.K.  
**Aér. S. Rp.** ..... Annual Reports of the Aeronautical Society of Great Britain. London.  
 1866—93. I.CE.i.; Oxon.B.; P.O.  
**A. Gén. Civ.** ..... Annales du Génie Civil; Recueil de Mémoires sur les Mathématiques pures et appliquées; l'Astronomie, la Chimie, la Physique, etc. Paris.  
 1862—80. B.M.; Camb.U.; Dub.R.C.S.i.; I.CE.i.; P.O.  
**A. Gén. Sc. Ps.** ..... Annales générales des Sciences Physiques. Bruxelles.  
 1819—21. Camb.U.; Glasg.U.; N.H.M.; R.S.  
**Ag. S. J.** ..... Journal of the Royal Agricultural Society of England. London.  
 1840— B.M.; Camb.U.; Chem.S.; Dub.T.C.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.  
 See **J. Ag. S.**  
**A. Hydrog.** ..... Annales Hydrographiques. Recueil d'avis, instructions, documents, et mémoires relatifs à l'Hydrographie et à la Navigation. Paris.  
 1849— B.M.; Ebinb.R.S.i.; Oxon.B.; R.A.S.i.; R.Geogr.S.; R.S.i.  
**Alb. I. T.** ..... Transactions of the Albany Institute. Albany.  
 1830— B.M.; N.H.M.; R.S.; S.K.i.  
**A. Lndw.** ..... Annalen der Landwirthschaft in den K. Preuss. Staaten; herausg. vom Präsidium des K. Landes Oecon. Collegiums. Berlin.  
 1843—71. P.O.  
**Am. Ac. Mm.** ..... Memoirs of the American Academy of Arts and Sciences. Cambridge and Boston.

## List of Serial Publications

1785— B.M.*i.*; Camb.P.S.; Camb.U.; Dub.R.D.S.*i.*; Dub.R.I.A.*i.*; Dub.T.C.*i.*; Edinb.R.S.; Geol.S.*i.*; I.CE.*i.*; Linn.S.; N.H.M.; Oxon.R.; P.O.*i.*; R.A.S.; R.Geogr.S.*i.*; R.S.; S.K.*i.*; U.C.L.*i.*  
 See **Bost. Am. Ac. Mm.** and **Bost. Mm. Am. Ac.**

- Am. Ac. P.** ..... Proceedings of the American Academy of Arts and Sciences. Boston.  
 1846— B.M.; Camb.P.S.; Camb.U.; Chem.S.*i.*; Dub.R.D.S.*i.*; Edinb.R.S.; Geol.S.; Glasg.P.S.; Glasg.U.*i.*; I.CE.*i.*; Linn.S.; Math.S.*i.*; N.H.M.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.*i.*
- Am. As. P.** ..... Proceedings of the American Association for the Advancement of Science. Washington, Salem.  
 1848— B.M.*i.*; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.*i.*; Glasg.P.S.*i.*; Glasg.U.*i.*; I.CE.*i.*; Linn.S.*i.*; N.H.M.; Oxon.B.; Oxon.R.*i.*; P.O.; R.A.S.*i.*; R.Geogr.S.*i.*; R.S.; S.K.
- Am. C.** ..... The American Chemist, a monthly Journal of theoretical Chemistry. New York.  
 1871—77. Chem.S.*i.*; N.H.M.; P.O.; Pharm.S.*i.*; S.K.*i.*
- Am. C. J.** ..... American Chemical Journal. Baltimore.  
 1879— Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.; Edinb.R.S.; Glasg.P.S.; N.H.M.; Oxon.R.; Pharm.S.*i.*; P.O.; R.S.; S.K.
- Am. C. S. J.** ..... The Journal of the American Chemical Society. New York, Easton, Pa.  
 1879— B.M.; Camb.P.S.; Chem.S.; Glasg.U.*i.*; N.H.M.; Pharm.S.; P.O.; S.K.; U.C.L.*i.*
- Am. Eng. & Railroad J.** American Engineer and Railroad Journal. New York.  
 1893— *Continuation of:* The Railroad and Engineering Journal, 1887—92. B.M.; I.CE.; P.O.
- Amiens Ac. Mm.** ..... (Mémoires de l'Académie des Sciences, Agriculture, Commerce, Belles-lettres, et Arts du département de la Somme. Amiens.  
**Amiens Mm.** .....  
**Amiens Mm. Ac.** ..... 1835— B.M.; Camb.U.; Dub.T.C.*i.*; N.H.M.*i.*; Oxon.B.*i.*; R.S.*i.*  
**Am. I. Mn. E. T.** ..... Transactions of the American Institute of Mining Engineers. Philadelphia, Easton, New York.  
 1871— Geol.S.; I.CE.; P.O.; S.K.
- A. Mines** ..... Annales des Mines, ou Recueil des Mémoires sur l'exploitation des Mines, et sur les Sciences et les Arts qui s'y rapportent. Paris.  
 1817— B.M.; Camb.U.; Chem.S.*i.*; Dub.R.I.A.; Edinb.R.S.; Edinb.U.*i.*; Geol.S.; Glasg.P.S.*i.*; Glasg.U.*i.*; I.CE.; N.H.M.; Oxon.B.(R.); P.O.; R.S.; S.K.
- Am. J. Mth.** ..... American Journal of Mathematics. Baltimore.  
 1878— B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Glasg.U.*i.*; I.CE.*i.*; Math.S.; Oxon.B.; Oxon.R.; R.A.S.; R.S.; S.K.; U.C.L.
- Am. J. Phm.** ..... American Journal of Pharmacy; published by the Philadelphia College of Pharmacy. Philadelphia.  
 1836— Chem.S.*i.*; Pharm.S.; P.O.*i.*
- Am. J. Psychol.** ..... The American Journal of Psychology. Baltimore, Worcester, Mass.  
 1888— B.M.; Oxon.B.; Oxon.R.; U.C.L.*i.*
- Am. J. Sc.** ..... The American Journal of Science and Arts; Silliman. New Haven.  
 1818— B.M.; Camb.P.S.*i.*; Camb.U.; Chem.S.*i.*; Dub.N.L.I.*i.*; Dub.R.C.S.*i.*; Dub.T.C.*i.*; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.*i.*; I.CE.*i.*; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.*i.*; R.Geogr.S.*i.*; R.S.; S.K.  
 See **Silliman J.**
- Am. Mcr. J.** ..... The American Monthly Microscopical Journal. New York.  
 1880— Camb.U.; Dub.N.L.I.; N.H.M.; Oxon.R.; Pharm.S.*i.*; P.O.
- Am. Mcr. S. P.** ..... Proceedings of the American Microscopical Society. Washington, Ithaca, N.Y.  
 1892—94. *Continuation of:* Proceedings of the American Society of Microscopists, 1878—91. *Continued as:* Transactions of the American Microscopical Society, 1895—. N.H.M.
- Am. Mcr. S. T.** ..... Transactions of the American Microscopical Society. Lincoln, Buffalo.  
 1895— *Continuation of:* Proceedings, etc., 1892—94. Glasg.U.*i.*; N.H.M.; Oxon.B.
- Am. Md. Ph. Reg.** ..... The American Medical and Philosophical Register or Annals of Medicine, Natural History, Agriculture and the Arts. New York.  
 1810—1814. B.M.; Geol.S.; R.S.; U.C.L.

## List of Serial Publications

- Am. Met. J.** ..... American Meteorological Journal. Detroit.  
1884—96. B.M.i.
- Am. Ntlist.** ..... The American Naturalist. An illustrated magazine of Natural History. Philadelphia, Boston.  
1868— B.M.; Camb.P.S.i.; Camb.U.; Edinb.R.S.i.; Geol.M.i.; Linn.S.i.; N.H.M.; Oxon.R.; R.Geogr.S.i.; R.S.i.; S.K.
- Am. Phm. As. P.** ..... Proceedings of the American Pharmaceutical Association. Philadelphia.  
1853— Pharm.S.
- Am. Ph. S. P.** ..... Proceedings of the American Philosophical Society. Philadelphia.  
1840— Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.; Math.S.i.; N.H.M.i.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Am. Ph. S. T.** ..... Transactions of the American Philosophical Society. Philadelphia.  
1771— B.M.i.; Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.i.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.i.
- See **Philad. T.**
- Am. Pol. J.** ..... The American Polytechnic Journal. Washington.  
1853—54. B.M.; P.O.
- Am. S. CE. T.** ..... Transactions of the American Society of Civil Engineers. New York.  
1871— I.CE.; P.O.; S.K.i.
- Am. S. Mcr. P.** ..... Proceedings of the American Society of Microscopists. Indianapolis, etc.  
1878—91. *Continued as:* Proceedings of the American Microscopical Society, 1892—94. N.H.M.
- Amst. Ak. Jb.** ..... Jaarboek van de Koninklijke Akademie van Wetenschappen gevestigd te Amsterdam. Amsterdam.  
1857— B.M.; Camb.P.S.; Dub.R.D.S.; Dub.T.C.; Edinb.R.S.i.; Glasg.P.S.i.; Glasg.U.i.; Linn.S.; N.H.M.; R.A.S.i.; R.Geogr.S.; R.S.; U.C.L.i.
- See **Amst. Jb. and Amst. Jb. Ak.**
- Amst. Ak. P.** ..... Koninklijke Akademie van Wetenschappen te Amsterdam. Proceedings of the Section of Sciences. Amsterdam.  
1899— Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; Oxon.B.; R.A.S.; R.Geogr.S.; R.S.; S.K.
- Amst. Ak. Vh.** ..... Verhandelingen der Koninklijke Akademie van Wetenschappen. Amsterdam.  
1854— Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.P.S.i.; Glasg.U.i.; Linn.S.; N.H.M.; Oxon.B.; R.A.S.; R.Geogr.S.; R.S.; S.K.i.; U.C.L.i.
- Amst. Ak. Vs.** ..... Verslagen der Zittingen van de Wis- en Natuurkundige Afdeling der Koninklijke Akademie van Wetenschappen. 1893, 1894.  
Verslagen van de Zittingen der Wis- en Natuurkundige Afdeling van de Koninklijke Akademie van Wetenschappen. 1895, 1896.  
Koninklijke Akademie van Wetenschappen te Amsterdam. Verslagen van de Gewone Vergaderingen der Wis- en Natuurkundige Afdeling. Amsterdam.  
1897— B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; N.H.M.; R.A.S.; R.Geogr.S.; R.S.; S.K.i.
- Amst. Ak. Vs. M.** ..... Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen. Afdeling Natuurkunde. Amsterdam.  
1853—92. B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.P.S.; Glasg.U.i.; Linn.S.; N.H.M.; Oxon.B.i.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- See **Amst. Vs. Ak.**
- Amst. Ak. Wet. P.** ..... Processen-Verbaal van de Gewone Vergaderingen der Koninklijke Akademie van Wetenschappen. Afdeling Natuurkunde. Amsterdam.  
1865—84. Dub.R.D.S.; Linn.S.i.; R.A.S.; R.S.
- Amst. Arch. Wisk. Gn.** ..... Archief uitgegeven door het Wiskundig Genootschap. Amsterdam.  
1856— B.M.; R.S.i.; U.C.L.i.
- See **Arch. Wisk. Gn.**
- Amst. I.** ..... Het Instituut. Amsterdam.  
1841—46. B.M.; Edinb.R.S.i.; S.K.



## List of Serial Publications

- Amst. Jb.** ..... } *See* **Amst. Ak. Jb.**
- Amst. Jb. Ak.** ..... }
- Amst. Mengelwerk** ..... Mengelwerk van uitgelezene en andere Wis- en Natuurkundige Verhandeligen; door het Genootschap der Mathematische Wetenschappen, etc. Amsterdam. 1796—1816. R.S.
- Amst. N. Vh.** ..... *See* **Mengelwerk Wisk. Vh.**
- Nieuwe Verhandeligen der eerste Klasse van het Koninklijk Nederlandsche Instituut van Wetenschappen, Letterkunde, en Schoone Kunsten te Amsterdam. Amsterdam. 1827—52. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.U.i.; Linn.S.; N.H.M.; R.S.; S.K.
- Amst. N. Ws. Ntk. Vh.** ... Nieuwe Wis- en Natuurkundige Verhandeligen van het Genootschap te Amsterdam. Amsterdam. 1844—54. B.M.; R.S.
- Amst. Ts. Nt. Wet.** ..... Tijdschrift voor Natuurkundige Wetenschappen en Kunsten. Amsterdam. 1810—11. Camb.P.S.; R.S.
- Amst. Ts. Ws. Nt. Wet.** Tijdschrift voor de Wis- en Natuurkundige Wetenschappen, Letterkunde, en Schoone Kunsten te Amsterdam. Amsterdam. 1847—52. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Linn.S.; Oxon.B.; R.S.
- Amst. Vh.** ..... Verhandeligen der Eerste Klasse van het Koninklijk Nederlandsche Instituut van Wetenschappen, Letterkunde, en Schoone Kunsten te Amsterdam. Amsterdam. 1812—25. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.U.i.; N.H.M.; Oxon.B.; R.S.; S.K.
- Amst. Vh. Ak.** ..... }
- Amst. Vs. Ak.** ..... *See* **Amst. Ak. Vs. M.**
- A. Mt.** ..... Annali di Matematica pura ed applicata...; Tortolini. Roma, Milano. 1858— B.M.; Camb.U.i.; Dub.R.D.S.; Dub.T.C.; Edinb.U.; Glasg.U.i.; Oxon.B.(R.); R.S.; U.C.L.
- A. Mth.** ..... *See* **Tortolini A.**
- Annals of Mathematics. University of Virginia. Charlottesville, Va. 1884— Camb.P.S.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.; Math.S.i.; Oxon.B.; S.K.i.
- Amt. Mch. S. J.** ..... The [Quarterly] Journal of the Amateur Mechanical Society. London. 1872—79. B.M.; P.O.; S.K.
- Anal.** ..... The Analyst, including the Proceedings of the Society of Public Analysts. London. 1877— B.M.; Camb.U.i.; Chem.S.; Geol.S.i.; Glasg.P.S.; Glasg.U.i.; Pharm.S.; P.O.; R.S.i.; U.C.L.i.
- Angers Mm. S. Ag.** ..... Mémoires de la Société d'Agriculture, Sciences, et Arts. Angers. 1831— B.M.; N.H.M.i.; Oxon.B.i.; R.S.i.
- Angers S. Sc. Bll.** ..... Bulletin de la Société d'Études Scientifiques d'Angers. Angers. 1872— B.M.; N.H.M.
- Anhalt Vh. Nt. Vr.** ..... Verhandlungen des naturhistorischen Vereins für Anhalt in Dessau. Dessau. 1840—70.
- An. Mét. Fr.** ..... Annuaire Météorologique de la France. Paris. 1849—52. *Continued as:* Annuaire de la Société Météorologique de France, 1853— B.M.; Camb.U.; Dub.T.C.; Glasg.U.i.; R.S.
- Anvers J. Phm.** ..... Journal de Pharmacie. Publié par la Société de Pharmacie d'Anvers. Anvers. 1845— B.M.; Oxon.R.; Pharm.S.i.
- A. Pon. Chauss.** ..... Annales des Ponts et Chaussées. Mémoires et documents relatifs à l'Art des Constructions et au Service de l'Ingénieur. Paris. 1831— B.M.; Camb.U.; Edinb.U.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; P.O.; R.S.i.
- A. Ps.** ..... *See* **Par. A. Pon. Chauss.**
- Annalen der Physik; Drude. Leipzig. 1900— *Continuation of:* Annalen der Physik und Chemie, 1824—99. B.M.; Camb.P.S.; Camb.U.; Chem.S.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; I.CE.; N.H.M.; Pharm.S.; P.O.; R.S.; S.K.; U.C.L.
- A. Ps. C.** ..... Annalen der Physik und Chemie; Poggenдорff, Wiedemann. Leipzig. 1824—99. *Continued as:* Annalen der Physik; Drude. 1900— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.; Dub.R.I.A.; Dub.T.C.;

## List of Serial Publications

- Edinb.R.S.; Edinb.U.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.;  
N.H.M.; Oxon.B.(R.); Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.
- See Pogg. A.**
- Arch. An. Pl. (Pl. Ab.)** ... Archiv für Anatomie und Physiologie. Physiologische Abtheilung. Leipzig.  
1877— Camb.P.S.; Camb.U.; Glasg.U.; N.H.M.i.; R.S.; S.K.; U.C.L.
- Arch. de l'Électr.** ..... Archives de l'Electricité; par A. de la Rive. Geneva.  
1841—45. B.M.; Camb.U.; P.O.; R.S.i.
- Arch. f. Oph.** ..... Archiv für Ophthalmologie. Berlin, Leipzig.  
1854— B.M.; Camb.U.; Glasg.U.; R.S.i.
- Arch. Md. Phm. Mil.** ... Archives de Médecine et de Pharmacie Militaires. Paris.  
1883— *Continuation of:* Recueil de Mémoires de Médecine, de Chirurgie, et de Pharmacie Militaires, 1815—82. B.M.
- Arch. Mkr. An.** ..... Archiv für mikroskopische Anatomie. Bonn.  
1865— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Glasg.U.; Linn.S.; N.H.M.i.; Oxon.R.; R.S.; S.K.; U.C.L.
- Arch. Mth. Ntvd.** ..... Archiv for Mathematik og Naturvidenskab. Kristiania.  
1876— B.M.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.U.i.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; R.S.
- Arch. Mth. Ps.** ..... Archiv der Mathematik und Physik; Grunert. Greifswald, Leipzig.  
1841— B.M.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Edinb.U.; Glasg.U.; Math.S.i.; Oxon.B.(R.); R.S.; U.C.L.i.
- See Grunert Arch.**
- Arch. Néerl.** ..... Archives Néerlandaises des Sciences Exactes et Naturelles. La Haye, Harlem.  
1866— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.i.; Dub.T.C.; Edinb.R.S.; Geol.M.i.; Geol.S.i.; Glasg.P.S.; Glasg.U.i.; Linn.S.; Math.S.; N.H.M.; Oxon.R.; P.O.; R.S.; S.K.; U.C.L.i.
- Arch. Oph.** ..... Archives of Ophthalmology. New York.  
1879— *Continuation of:* Archives of Ophthalmology and Otolology, 1869—78. B.M.i.; Coll.Surg.; Glasg.U.i.; Oxon.R.
- Arch. Ot.** ..... Archives of Otolology. New York.  
1879— *Continuation of:* Archives of Ophthalmology and Otolology, 1869—78. B.M.i.; Coll.Surg.; Glasg.U.i.; Oxon.R.
- Arch. Phm.** ..... Archiv des Apothekervereins im nördlichen Teutschland. Archiv der Pharmacie. Schmalkalden, Lemgo, Hannover, etc.  
1822— Pharm.S.i.
- Arch. Sc. Ps. Nt.** ..... Bibliothèque Universelle. Archives des Sciences Physiques et Naturelles. Genève.  
1846— B.M.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Edinb.U.; Glasg.U.; I.CE.i.; N.H.M.; Oxon.B.; P.O.; R.Geogr.S.i.; R.S.; S.K.
- See Bb. Un. Arch.**
- Arch. Wisk. Gn.** ..... **See Amst. Arch. Wisk. Gn.**
- Arg. S. Ci. A.** ..... Anales de la Sociedad Científica Argentina. Buenos Aires.  
1876— B.M.i.; I.CE.i.; N.H.M.
- Arnhem Ntk.** ..... Naturkundig Tijdschrift, inhoudende Pijjsica, Chemie, Pharmacie, Natuurlijke Historie en Literatuur. Arnhem.  
1843—60. N.H.M.
- As.** ..... L'Astronomie. Revue d'Astronomie populaire, de Météorologie et de Physique du Globe. Paris.  
1882—94. B.M.; Camb.U.i.; Edinb.R.S.; R.A.S.; R.S.i.; S.K.
- As. & Asps.** ..... Astronomy and Astrophysics. Northfield, Minn.  
1892—94. *Continuation of:* The Sidereal Messenger, 1883—91. *Continued as:* The Astrophysical Journal, 1895—. B.M.; Camb.P.S.i.; Dub.N.L.I.i.; R.A.S.; R.S.; S.K.
- A. Sc.** ..... Annaes das Sciencias e Lettras, publicados debaixo dos auspicios da Academia Real das Sciencias; Sciencias mathematicas, physicas, historico-naturaes e medicas. Lisboa.  
1857— B.M.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; R.A.S.i.; R.S.i.; S.K.i.
- See Lisb. A.**
- A. Sc. Lomb. Ven.** ..... Annali delle Scienze del Regno Lombardo-Veneto. Padova e Venezia.  
1831—45. B.M.; Camb.U.; Dub.T.C.i.; Oxon.B.
- As. Fr. C. R.** ..... Association Française pour l'Avancement des Sciences. Compte Rendu. Paris, etc.

## List of Serial Publications

- 1872— B.M.; Camb.U.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; N.H.M.; P.O.; R.A.S.i.; R.S.; S.K.
- Ashmol. S. P.** ..... Abstracts of the Proceedings of the Ashmolean Society. Oxford.
- 1844—81. Camb.U.; Dub.R.D.S.; Edinb.R.S.i.; Geol.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.i.; R.S.; S.K.i.
- Ashmol. S. T.** ..... Transactions of the Ashmolean Society. Oxford.
- 1834—76. Camb.U.; Dub.R.D.S.; Edinb.R.S.; N.H.M.i.; Oxon.B.i.; Oxon.R.; P.O.i.; R.S.i.; S.K.i.
- As. J.** ..... The Astronomical Journal. Boston.
- 1851—61. 1888— B.M.; Camb.U.; Glasg.U.i.; Oxon.B.; Oxon.R.i.; R.A.S.; R.S.i.; S.K.
- See Gould As. J.*
- As. Nr.** ..... Astronomische Nachrichten; Schumacher. Altona.
- 1823— B.M.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.; Edinb.U.i.; Glasg.U.i.; I.CE.i.; Oxon.B.(R.); R.A.S.; R.S.; S.K.i.; U.C.L.i.
- Asps. J.** ..... The Astrophysical Journal. Chicago.
- 1895— *Continuation of:* Astronomy and Astrophysics, 1892—94. B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.R.D.S.; Glasg.U.; Oxon.R.i.; R.A.S.; R.S.; S.K.; U.C.L.
- As. Researches** ..... Asiatick Researches; or Transactions of the [Bengal] Society instituted for inquiring into the History and Antiquities, Arts, Sciences, and Literature of Asia. Calcutta.
- 1788—1836. B.M.; Camb.U.; Edinb.R.S.i.; Edinb.U.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- As. S. J.** ..... Journal of the Royal Asiatic Society. London.
- 1834— B.M.; Camb.U.; Dub.R.D.S.; Edinb.R.S.i.; Edinb.U.i.; Geol.S.; Glasg.U.i.; Linn.S.; Oxon.B.; Oxon.R.; P.O.i.; R.Geogr.S.; R.S.i.; S.K.; U.C.L.i.
- As. S. Mm.** ..... Memoirs of the [Royal] Astronomical Society of London. London.
- 1822— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; Oxon.B.; Oxon.R.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.
- As. S. M. Not.** ..... Monthly Notices of the [Royal] Astronomical Society of London. London.
- 1827— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Oxon.B.i.; Oxon.R.i.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.
- As. S. Pac. Pb.** ..... Publications of the Astronomical Society of the Pacific. San Francisco.
- 1889— B.M.; Camb.U.i.; Dub.R.D.S.i.; Glasg.U.i.; R.A.S.; R.S.i.
- Assur. Mg.** ..... The Assurance Magazine and Journal of the Institute of Actuaries. London.
- 1830—67. *Continued as:* Journal of the Institute of Actuaries, 1869— B.M.; Camb.U.i.; Edinb.R.S.i.; Geol.S.i.; R.A.S.i.; R.S.i.; U.C.L.i.
- At. Ac. It.** ..... Atti dell' Accademia Italiana di Scienze, etc. Livorno.
1810. B.M.; Camb.U.; Dub.T.C.; N.H.M.; Oxon.B.
- A. Tél.** ..... Annales Télégraphiques, publiées sous le patronage du Directeur Général des Lignes Télégraphiques. Paris.
- 1855— B.M.i.; Camb.U.i.; I.CE.i.; P.O.
- At. Sc. It.** ..... Riunione degli Scienziati Italiani. Atti. Pisa, etc.
- 1839— B.M.; Camb.U.; N.H.M.; R.S.
- At. S. Elvet.** ..... Atti della Società Elvetica delle Scienze Naturali. Lugano.
- 1833, 1860. N.H.M.; S.K.
- See Act. S. Helv., Sch. Gs. Vh. and Sch. Nf. Gs. Vh.*
- Aube Mm. S. Ac.** ..... {Mémoires de la Société [Académique] d'Agriculture, des Sciences, et des Lettres du département de l'Aube. Troyes.
- Aube Mm. S. Ag.** ..... {
- 1823— B.M.; Camb.U.i.; Dub.T.C.i.; Oxon.B.; R.S.i.
- Auk** ..... The Auk. A Quarterly Journal of Ornithology. Boston, New York.
- 1884— *Continuation of:* Bulletin of the Nuttall Ornithological Club, 1876—83. B.M.; Dub.N.L.I.; Linn.S.i.; N.H.M.
- A. Un. Blg.** ..... Annales des Universités de Belgique. Bruxelles.
- 1842—63. Camb.U.; Oxon.B.; P.O.; R.S.i.
- See Brux. A. Un.*

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- Ausl.** ..... Das Ausland. München und Stuttgart.  
1828—93. B.M.; Camb.U.i.; N.H.M.i.; Oxon.B.i.; R.Geogr.S.i.
- Aust. As. Rp.** ..... Report of the.....Meeting of the Australasian Association for the  
Advancement of Science. Sydney.  
1888— Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.; Dub.R.I.A.i;  
Edinb.R.S.; Edinb.U.i.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.i.;  
Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.; R.S.; S.K.
- Auvergne A. Sc.** ..... Annales Scientifiques, Littéraires, et Industrielles de l'Auvergne,  
publiées par l'Académie des Sciences, Belles-Lettres, et Arts de  
Clermont-Ferrand. Clermont-Ferrand.  
1828—58. B.M.; Camb.U.; Oxon.B.; R.S.
- Bamb. Nf. Gs. B.** ..... Bericht des Naturforschenden Gesellschaft zu Bamberg. Bamberg.  
1852— N.H.M.
- Barcel. Ac. Bl.** ..... Boletín de la Real Academia de Ciencias y Artes de Barcelona.  
Barcelona.  
1892— N.H.M.
- Barcel. Ac. Mm.** ..... Memorias de la Real Academia de Ciencias Naturales y Artes de  
Barcelona. Barcelona.  
[1st Series cannot be traced.] 1876— N.H.M.
- B. A. Rp.** ..... Report of the.....Meeting of the British Association for the  
Advancement of Science. London.  
1831— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.;  
Dub.R.I.A.i.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.;  
Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.i.;  
Oxon.R.; Pharm.S.i.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.;  
U.C.L.
- Barrow FC. Rp.** ..... Barrow Naturalists' Field Club and Literary and Scientifico  
Association. Annual Report and Proceedings. Barrow.  
1877— B.M.; Camb.U.; Geol.S.; N.H.M.; Oxon.B.i.
- Basel Vh.** ..... Verhandlungen der Naturforschenden Gesellschaft in Basel. Basel.  
1857— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.i.;  
Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Geol.S.; Linn.S.;  
N.H.M.; Oxon.R.; R.A.S.i.; R.S.; S.K.; U.C.L.i.
- Batav. Ntk. Ts.** ..... Natuurkundig Tijdschrift voor Nederlandsch-Indië. Batavia.  
1850— Camb.P.S.; Camb.U.; Edinb.R.S.i.; Linn.S.; N.H.M.;  
R.A.S.i.; R.S.i.; U.C.L.i.
- Bath S. J.** ..... Journal of the Bath and West of England Society for the En-  
couragement of Agriculture, Arts, Manufactures and Commerce.  
Bath.  
1853— B.M.; Camb.U.; Dub.T.C.; Geol.M.; Oxon.B.; P.O.; S.K.  
Zeitschrift für Physik, Mathematik, und verwandte Wissenschaften;  
Baumgartner und von Ettingshausen. Wien.  
1826—42. B.M.; Camb.U.i.; Oxon.B.i.(R.); R.S.i.; U.C.L.i.
- Baumgartner Z.** ..... Bibliothéque Britannique, ou Recueil extrait des Ouvrages Anglais  
périodiques et autres: partie des Sciences et Arts. Genève.  
1796—1815. B.M.; Edinb.U.; N.H.M.; Oxon.B.; P.O.; R.S.
- Bb. Brit.** ..... Biblioteca Italiana, ossia Giornale di Letteratura, Scienze, etc.  
Milano.  
1816—56. B.M.; Edinb.R.S.i.; Oxon.B.
- Bb. It.** ..... Bibliotheca Mathematica. Stockholm and Leipzig.  
1887— B.M.; Camb.U.; Glasg.U.; Oxon.B.; Oxon.R.; R.S.;  
S.K.i.; U.C.L.
- Bb. Mth.** ..... Bibliothèque Universelle des Sciences, Belles-Lettres, et Arts, faisant  
suite à la Bibliothèque Britannique rédigée à Genève. Partie des  
Sciences. Genève.  
1816—45. B.M.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.i.; Edinb.U.;  
Glasg.U.; N.H.M.; Oxon.B.; P.O.; R.Geogr.S.i.; R.S.; S.K.
- Bb. Un.** ..... Bibliothèque Universelle. Archives des Sciences Physiques et  
Naturelles. Genève.  
1846— B.M.; Camb.U.; Chem.S.i.; Dub.N.L.L.i.; Dub.R.D.S.i.;  
Dub.R.I.A.i.; Edinb.R.S.; Edinb.U.; Glasg.U.; I.CE.i.; N.H.M.;  
Oxon.B.; P.O.; R.Geogr.S.i.; R.S.; S.K.
- Bb. Un. Arch.** ..... See Arch. Sc. Ps. Nt.
- Belfast NH. S. P.** ..... (Report and Proceedings of the Belfast Natural History and Philo-  
sophical Society. Belfast.  
1852— B.M.i.; Camb.P.S.; Dub.N.L.L.i.; Dub.R.D.S.; Dub.T.C.;  
Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; N.H.M.; P.O.i.; R.A.S.



## List of Serial Publications

- Beng. As. S. J.**..... Journal of the Asiatic Society of Bengal. Calcutta.  
1832— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.;  
Dub.T.C.; Edinb.R.S.i.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.;  
N.H.M.; Oxon.B.; Oxon.R.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.  
*See Beng. J. As. S.*
- Beng. As. S. P.** ..... Proceedings of the Asiatic Society of Bengal. Calcutta.  
1865— B.M.; Camb.P.S.i.; Camb.U.; Dub.T.C.; Edinb.R.S.i.;  
Edinb.U.i.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.;  
Oxon.B.; Oxon.R.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.
- Beng. J. As. S.**..... *See Beng. As. S. J.*
- Berg-Hm. Jb.** ..... Berg- und Hüttenmännisches Jahrbuch der k.k. Schemnitzer-  
Bergakademie und der k.k. Montan-Lehranstalten zu Leoben  
und Pöfgram. Wien.  
1851— B.M.i.; Geol.S.i.; I.CE.i.; P.O.i.; S.K.  
*See Jb. Berg-Hm., Leoben Berg-Hm. Jb. and Wien Berg-  
Hm. Jb.*
- Berg-Hm. Ztg.** ..... Berg- und Hüttenmännische Zeitung; mit besonderer Berücksich-  
tigung der Mineralogie und Geologie; Hartmann. Nordhausen  
und Leipzig.  
1842— B.M.; I.CE.i.; N.H.M.; P.O.; S.K.
- Berl. Ab.** ..... { Abhandlungen der Königlichen Akademie der Wissenschaften zu  
Berlin. Berlin.
- Berl. Ak. Ab.** ..... { 1804— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Edinb.R.S.;  
Edinb.U.; Geol.M.i.; Geol.S.i.; Glasg.U.; Linn.S.i.; N.H.M.;  
Oxon.B.; Oxon.R.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.;  
S.K.i.; U.C.L.i.
- Berl. Ak. Mb.** ..... Monatsberichte der K. Preuss. Akademie der Wissenschaften zu  
Berlin. Berlin.  
1856—81. B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.i.;  
Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Geol.S.; Glasg.P.S.i.;  
Glasg.U.i.; I.CE.i.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.;  
Oxon.R.; P.O.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Berl. Ak. Sb.** ..... *See Berl. Mb.*  
Sitzungsberichte der K. Preussischen Akademie der Wissenschaften  
zu Berlin. Berlin.  
1882— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.;  
Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.i.; Geol.S.;  
Glasg.P.S.; Glasg.U.; I.CE.i.; Linn.S.; Math.S.; N.H.M.i.;  
Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.;  
U.C.L.
- Berl. B.** ..... Bericht über die zur Bekanntmachung geeigneten Verhand-  
lungen der K. Preuss. Akademie der Wissenschaften zu Berlin.  
Berlin.  
1836—55. B.M.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.; Linn.S.;  
N.H.M.; Oxon.B.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.
- Berl. B.** ..... Berichte der Deutschen Chemischen Gesellschaft. Berlin.  
1868— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.; Glasg.  
P.S.; Glasg.U.; N.H.M.; Oxon.R.; Pharm.S.i.; P.O.; R.S.;  
S.K.; U.C.L.i.
- Berl. Gs. Nt. Fr. N. Schr.** *See D. C. Gs. B.*  
Neue Schriften der Gesellschaft Naturforschender Freunde zu  
Berlin. Berlin.  
1795—1803. B.M.; N.H.M.; S.K.
- Berl. Mb.** ..... *See Berl. Ak. Mb.*
- Berl. Mm.** ..... { Mémoires de l'Académie Royale des Sciences de Berlin. Berlin.
- Berl. Mm. Ac.** ..... { 1770—1804. B.M.i.; Camb.U.; Dub.R.D.S.i.; Dub.T.C.i.; Edinb.  
R.S.; Edinb.U.; Glasg.U.i.; N.H.M.; Oxon.B.; P.O.; R.S.;  
S.K.; U.C.L.
- Berl. Pol. Gs. Vh.** ..... Verhandlungen der Polytechnischen Gesellschaft. Berlin.  
1851— R.S.i.
- Berl. Ps. Gs. Vh.** ..... Verhandlungen der Physikalischen Gesellschaft in Berlin. Berlin.  
1882—98. *Continued as:* Verhandlungen der Deutschen Physik-  
alischen Gesellschaft, 1899— Camb.P.S.i.; Camb.U.; Glasg.U.;  
N.H.M.; Oxon.B.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.i.
- Berl. Ps. Reichsanst. Ab.** ..... Wissenschaftliche Abhandlungen der Physikalisch-Technischen  
Reichsanstalt. Berlin.  
1894— Camb.P.S.; Camb.U.i.; Chem.S.; Edinb.R.S.; Glasg.U.i.;  
P.O.; S.K.; U.C.L.

## List of Serial Publications

- Berl. Tel. Vr. Z.** ..... { Zeitschrift des Deutsch-Oesterreichischen Telegraphen-Vereins.  
Herausg. in dessen Auftrage von der K. Preuss. Telegraphen-  
Direction. Berlin.  
1854—69. P.O.
- Berl. Z. Tel.** ..... {
- Bern Mt.** ..... Mittheilungen der Naturforschenden Gesellschaft in Bern. Bern.  
1843— B.M.; Camb.P.S.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.  
R.S.i.; N.H.M.; R.S.; S.K.
- Besançon Sé. Pbl.** ..... Séances publiques de l'Académie des Sciences, Arts et Belles-  
Lettres de Besançon. Besançon.  
1806— B.M.; R.S.i.
- Béziers S. Sc. Bll.** ..... Bulletin de la Société d'Étude des Sciences Naturelles de Béziers.  
Béziers.  
1876— N.H.M.; R.S.i.
- Birm. Ph. S. P.** ..... Proceedings of the Birmingham Philosophical Society. Birmingham.  
1876— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.i.; Dub.T.C.i.;  
Edinb.R.S.; Edinb.U.i.; Geol.M.; Glasg.P.S.; Glasg.U.; Linn.S.i.;  
N.H.M.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.;  
U.C.L.i.
- Blg. A. Tr. Pbl.** ..... Annales des Travaux Publics de Belgique. Bruxelles.  
1843— B.M.; I.CE.i.; P.O.; S.K.i.  
See **Brux. A. Tr. Pbl.**
- Blg. S. Ag. J.** ..... Journal de la Société Centrale d'Agriculture de Belgique. Bruxelles.  
1854— B.M.i.; P.O.
- Bll. As.** ..... Bulletin Astronomique publié sous les Auspices de l'Observatoire de  
Paris. Paris.  
1884— B.M.; Camb.U.; Edinb.R.S.; Oxon.R.; R.A.S.; S.K.
- Bll. Phm.** ..... Bulletin de Pharmacie; Parmentier, etc. Paris.  
1809—14. *Continued as:* Journal de Pharmacie, 1815—41. B.M.;  
Camb.U.; Chem.S.; Oxon.B.; Pharm.S.; P.O.; R.S.
- Bll. Sc. Mth.** ..... Bulletin des Sciences Mathématiques. Paris.  
1885— Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.U.; Math.S.;  
Oxon.B.; Oxon.R.; R.A.S.; R.S.; S.K.; U.C.L.
- Bll. Sc. Mth. As.** ..... Bulletin des Sciences Mathématiques et Astronomiques. Paris.  
1870—84. B.M.; Camb.U.; Edinb.R.S.; Glasg.U.; Math.S.;  
Oxon.R.; R.A.S.i.; R.S.; S.K.; U.C.L.i.
- Blue Hill Obs. Bll.** ..... Blue Hill Meteorological Observatory. Bulletin. Readville (?).  
1898— Met. Office.
- Bode As. Jb.** ..... { Astronomisches Jahrbuch, nebst einer Sammlung der neuesten in  
die astronomischen Wissenschaften einschlagenden Abhandlungen,  
Beobachtungen, und Nachrichten; Bode. Berlin.  
1776—1829. Dub.T.C.i.; Glasg.U.; R.A.S.; R.S.i.
- Bode Jb.** ..... {
- Böhm. Gs. Ab.** ..... Abhandlungen der K. Böhmischen Gesellschaft der Wissenschaften.  
Prag.  
1804—92. B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.i.; Edinb.  
R.S.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.S.i.; S.K.i.  
See **Prag Ab.**
- Böhm. Gs. Ws. Jbr.** ..... Jahresbericht der Königl. Böhm. Gesellschaft der Wissenschaften.  
Prag.  
1876— B.M.i.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; R.S.
- Böhm. Mschr. Gs. Ms.** ... Monatschrift des Gesellschaft des Vaterländischen Museums in  
Böhmen. Prag.  
1827—29. B.M.; Camb.U.; N.H.M.
- Bologna Ac. Mm.** ..... { Memorie della Accademia delle Scienze dell' Istituto di Bologna.  
Bologna.
- Bologna Ac. Sc. Mm.** ..... {
- Bologna Mm. Ac.** ..... { 1850— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; N.H.M.;  
Oxon.B.; R.A.S.; R.S.; S.K.i.; U.C.L.i.
- Bologna Mm. Ac. Sc.** ..... {
- Bologna Mm. I. It.** ..... Memorie dell' Istituto Nazionale Italiano: Classe di Fisica e di  
Matematica. Bologna.  
1806—13. B.M.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.;  
N.H.M.; Oxon.B.i.; R.S.i.
- Bologna N. A.** ..... Nuovi Annali delle Scienze Naturali; Alessandrini, Bertolini,  
Gherardi, e Ranzani. Bologna.  
1838—54. Camb.U.; Geol.S.i.; N.H.M.; Oxon.B.i.; R.Geogr.S.i.;  
R.S.; S.K.  
See **N. A. Sc. Nt.**
- Bologna N. Cm.** ..... Novi Commentarii Academiæ Scientiarum Instituti Bononiensis.  
Bononiæ.  
1834—49. Camb.U.; Edinb.R.S.; N.H.M.; Oxon.B.; R.S.

## List of Serial Publications

- Bologna Opusc. Sc.** ..... Opuscoli Scientifici. Bologna.  
1817—23. B.M.; Camb.U.; Edinb.R.S.i.; N.H.M.; S.K.
- Bologna Opusc. Sc. N. Col.** ..... Nuova collezione d' Opuscoli Scientifici. Bologna.  
1824—25. Camb.U.
- Bologna Rd.**..... Rendiconto delle Sessioni dell' Accademia delle Scienze dell' Istituto di Bologna. Bologna.  
1851— B.M.; Camb.U.i.; Dub.T.C.; Edinb.R.S.i.; Glasg.U.i.; N.H.M.i.; Oxon.B.i.; R.A.S.i.; R.S.i.; U.C.L.i.
- Bone Ac. Hip. Bll.** ..... Bulletin de l'Académie d'Hippone. Bone.  
1865— Camb.U.; N.H.M.i.
- Bonn NH. Vr. Vh.** ..... Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande, Westfalens und des Reg.-Bezirks Osnabrück. Bonn.  
1844— B.M.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; N.H.M.; Oxon.R.; R.S.i.; S.K.
- Bonn Niedr. Gs. Sb.** ..... Sitzungsberichte der Niederrheinischen Gesellschaft für Natur- und Heilkunde zu Bonn. Bonn.  
1854— B.M.i.; Camb.U.i.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; Oxon.R.; Oxon.B.; R.S.i.; S.K.
- Bonn Sb. Niedr. Gs.** ..... {
- Bordeaux Ac. Act.**..... Recueil des Actes de l'Académie des Sciences, Belles-lettres, et Arts de Bordeaux. Bordeaux.  
1839— B.M.i.; Dub.R.I.A.i.; Dub.T.C.i.; N.H.M.i.; Oxon.B.i.; R.S.i.
- See **Bordeaux Act.**
- Bordeaux Ac. Sc. Sé. Pbl.** { Séances publiques de l'Académie Royale des Sciences, Belles-lettres, et Arts de Bordeaux. Bordeaux.  
**Bordeaux Ac. Sé. Pbl.** { 1819—37. N.H.M.
- Bordeaux Act.** ..... { See **Bordeaux Ac. Act.**
- Bordeaux Act. Ac. Sc.** ..... {
- Bordeaux J. Md.**..... Journal de Médecine de Bordeaux. Bordeaux.  
1843?—61. Coll.Surg.i.
- Bordeaux Mm. S. Sc.** ... Mémoires de la Société des Sciences Physiques et Naturelles de Bordeaux. Bordeaux.
- Bordeaux Mm. S. Sc. Ps.** {
- Bordeaux S. Sc. Mm.** { 1855— Camb.P.S.; Dub.R.D.S.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.P.S.; Linn.S.; Math.S.; N.H.M.; Oxon.B.; R.A.S.; R.S.; S.K.
- Bordeaux S. Sc. PV.**..... Procès-Verbaux des Séances de la Société des Sciences Physiques et Naturelles de Bordeaux. Paris, Bordeaux.  
1894— Camb.P.S.; Dub.R.D.S.i.; Edinb.R.S.; Math.S.; N.H.M.; R.A.S.; R.S.
- Bost. Am. Ac. Mm.** ..... Memoirs of the American Academy of Arts and Sciences. Cambridge and Boston.  
1785— B.M.i.; Camb.P.S.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Geol.S.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.R.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.i.
- See **Am. Ac. Mm. and Bost. Mm. Am. Ac.**
- Bost. J. Ph.** ..... The Boston Journal of Philosophy and the Arts; Webster, etc. Boston.  
1824—26. B.M.
- Bost. Mm. Am. Ac.** ..... See **Am. Ac. Mm. and Bost. Am. Ac. Mm.**
- Bost. P. NH. S.** ..... Proceedings of the Boston Society of Natural History. Boston.  
1841— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Geol.S.; Glasg.P.S.i.; Linn.S.i.; N.H.M.; Oxon.R.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Br. Archt. I. Pp.** ..... Papers read at the Royal Institute of British Architects. London.  
1854—78. B.M.; Camb.U.i.; Edinb.R.S.i.; P.O.; S.K.; U.C.L.i.
- See **Br. Archt. Pp.**
- Br. Archt. I. T.** ..... Transactions of the Institute of British Architects of London.  
1836—42; 1879—92. B.M.i.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; I.CE.; Oxon.B.; P.O.; R.S.; U.C.L.i.
- See **Br. Archt. T.**
- Br. Archt. J.** ..... Journal of the Royal Institute of British Architects. London.  
1885— Camb.U.i.; Glasg.U.i.; I.CE.; Oxon.B.; P.O.; U.C.L.
- Br. Archt. Pp.** ..... { See **Br. Archt. I. Pp.**
- Br. Archt. Pp. (& T.)**..... {
- Br. Archt. T.** ..... { See **Br. Archt. I. T.**
- Braunschw. Vr. Nt. Jbr.** ..... Jahresbericht des Vereins für Naturwissenschaft zu Braunschweig. Braunschweig, Altenburg.  
1879— Dub.R.I.A.i.; Edinb.R.S.; Linn.S.; N.H.M.; R.S.



## List of Serial Publications

- Brem. Ab.** ..... Abhandlungen herausgegeben vom Naturwissenschaftlichen Vereine zu Bremen. Bremen.  
1868— B.M.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Linn.S.; N.H.M.; R.S.; S.K.
- Brescia At. Cm.** ..... { Commentarj della Accademia di Scienze, Lettere, ed Arti dell' Ateneo di Brescia. Brescia.  
**Brescia Cm.** ..... { 1808— B.M.; Camb.U.; N.H.M.i.; Oxon.B.i.; R.S.i.
- Bresl. Jbr. Sl. Gs.** ..... Jahresbericht der Schlesischen Gesellschaft für vaterländische Cultur. Breslau.  
**Bresl. Schl. Gs. Jbr.** ..... 1850— Dub.R.D.S.i.; Dub.R.I.A.i.; Geol.S.i.; N.H.M.; R.S.; S.K.  
**Bresl. Sl. Gs. Jbr.** ..... Uebersicht der Arbeiten und Veränderungen der Schlesischen Gesellschaft für vaterländische Cultur. Breslau.  
**Bresl. Sl. Gs. Übs.** ..... 1824—49. B.M.; Geol.S.i.; N.H.M.; R.S.; S.K.
- Bristol Nt. S. P.** ..... Proceedings of the Bristol Naturalists' Society. Bristol.  
1866— B.M.i.; Camb.U.i.; Geol.M.; Geol.S.i.; Linn.S.; N.H.M.; R.S.i.; U.C.L.i.
- Brugnatelli G.** ..... Giornale di Fisica, Chimica, e Storia Naturale; Brugnatelli, etc. Pavia.  
1808—27. B.M.; Camb.U.; Dub.T.C.; N.H.M.i.; Oxon.B.; P.O.; R.S.
- Brünn Mt.** ..... Mittheilungen der kaiserlich-königlichen Mährish-Schlesischen Gesellschaft zur Beförderung des Ackerbaues der Natur- und Landeskunde in Brünn. Brünn.  
1821— B.M.; R.S.i.; S.K.i.
- Brünnow As. Not.** ..... Astronomical Notices; Brünnow. Ann Arbor, Mich.  
1858—62. R.A.S.; R.S.i.
- Brünn Vh.** ..... Verhandlungen des Naturforschenden Vereins zu Brünn. Brünn.  
1863— Camb.U.i.; Dub.R.I.A.; Linn.S.; N.H.M.; R.S.
- Brux. Ac. Bll.** ..... Bulletins de l'Académie Royale des Sciences, etc., de Belgique. Bruxelles.  
1834— B.M.i.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.i.
- Brux. Ac. Mm.** ..... See **Brux. Bll. Ac.**  
**Brux. Ac. Sc. Mm.** ..... { Mémoires de l'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique. Bruxelles.  
1820— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.; Edinb.U.; Glasg.U.i.; I.CE.i.; Linn.S.i.; N.H.M.; Oxon.B.(R.); P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.
- Brux. A. Tr. Pbl.** ..... See **Brux. Mm. Ac. Sc.**  
**Brux. A. Un.** ..... { See **Blg. A. Tr. Pbl.**  
Annales des Universités de Belgique. Bruxelles.  
1842—63. Camb.U.; Oxon.B.; P.O.; R.S.i.
- Brux. Bll. Ac.** ..... See **A. Un. Blg.**  
**Brux. Mm. Ac. Sc.** ..... See **Brux. Ac. Bll.**  
**Brux. Mm. Cour.** ..... See **Brux. Ac. Mm.**  
**Brux. Mm. Cour. 4<sup>o</sup>** ..... { Mémoires Couronnés et Mémoires des Savants Étrangers, publ. par l'Acad. Roy. des Sciences, etc. de Belgique. 4to. Bruxelles.  
1818— B.M.i.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Edinb.U.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.i.; N.H.M.; Oxon.B.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.
- Brux. Mm. Cour. 8<sup>o</sup>** ..... Mémoires Couronnés et autres Mémoires, publ. par l'Acad. Roy. des Sciences, etc. de Belgique. 8vo. Bruxelles.  
1840— B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.i.; N.H.M.; Oxon.B.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.
- Brux. S. As. Bll.** ..... Bulletin de la Société Belge d'Astronomie. Comptes Rendus des Séances mensuelles de la Société et Revue des Sciences d'Observation. Astronomie, Météorologie, Géodésie et Physique du Globe. Bruxelles.  
1896— R.A.S.
- Brux. S. Blg. Mcr. Bll.** ..... Bulletin de la Société Belge de Microscopie. Bruxelles, Paris.  
1875— Camb.P.S.i.; Glasg.P.S.i.; N.H.M.; P.O.i.
- Brux. S. Sc. A.** ..... Annales de la Société Scientifique de Bruxelles. Bruxelles.  
1877— B.M.; Dub.N.L.I.i.; Edinb.R.S.; I.CE.i.; N.H.M.
- Btr. Geops.** ..... Beiträge zur Geophysik. Stuttgart, Leipzig.  
1887— Camb.U.; Geol.M.; Geol.S.; Oxon.B.; R.Geogr.S.; R.S.; S.K.

## List of Serial Publications

- Bucarest Ac. Rom. A. ...** Analele Academiei Romane. Bucuresci.  
1880— B.M.; Camb.U.i.; N.H.M.i.
- Bucarest S. Sc. Bl.....** Buletinul Societății de Științe Fizice (Fizica, Chimia și Mineralogia)  
din Bucuresci-România.  
[1892]—[1896].  
Buletinul Societății de Științe din Bucuresci-România. Bucuresci.  
(Bulletin de la Société des Sciences Bucarest-Roumanie.)  
[1897]— Glasg.P.S.; Glasg.U.; N.H.M.; R.S.i.; U.C.L.i.
- Buffalo Bl. ....** Bulletin of the Buffalo Society of Natural Sciences. Buffalo, N.Y.  
1873— B.M.; Camb.U.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.;  
Linn.S.i.; N.H.M.; R.S.
- Caen Ac. Mm.....** Mémoires de l'Académie des Sciences, Arts et Belles-Lettres de  
Caen. Caen.
- Caen Mm. Ac.....** { 1811— B.M.i.; Camb.U.i.; Dub.T.C.i.; N.H.M.i.; Oxon.B.i.; R.S.i.;  
S.K.i.
- Caen Mm. S. L. ....** Mémoires de la Société Linnéenne [du Calvados] de Normandie. Caen.  
1824— B.M.; Camb.U.; Geol.M.; Geol.S.i.; Linn.S.i.; N.H.M.;  
R.S.i.; U.C.L.i.
- Caen Tr. ....** Précis des Travaux de la Société d'Agriculture etc. de Caen. Caen.  
1811—58. B.M.; Camb.U.i.
- Cæs. Leop. Ac. N. Acta.** Nova Acta physico-medica Academiæ Cæs. Leopoldino-Carolinæ  
naturæ Curiosorum. Erlangen, Bonn, Breslau.  
1758— Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.; Edinb.R.S.i.;  
Edinb.U.; Geol.S.i.; Glasg.U.; Linn.S.i.; N.H.M.; Oxon.R.;  
Pharm.S.i.; R.A.S.i.; R.S.; S.K.i.; U.C.L.i.  
*See Ac. Cæs. Leop. N. Acta and Ac. Nt. C. N. Acta*
- Calc. Eng. J. ....** The Engineers' Journal and Railway Chronicle of India and the  
Colonies. Calcutta.  
1858—69. I.C.E.i.; P.O.
- Calc. J. NH.....** The Calcutta Journal of Natural History. Calcutta.  
1841—48. B.M.; Camb.U.; Dub.R.D.S.; Geol.S.i.; Linn.S.i.;  
N.H.M.; P.O.; R.S.; S.K.
- Calif. Ac. P. ....** Proceedings of the California Academy of Natural Sciences. San  
Francisco.  
1854— B.M.i.; Camb.P.S.i.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.;  
Glasg.P.S.; Linn.S.i.; N.H.M.; P.O.i.; R.Geogr.S.; R.S.i.;  
S.K.i.
- Camb. and Dubl. Mth. J.** The Cambridge and Dublin Mathematical Journal; Thomson and  
Ferrers. Cambridge.  
1846—54. B.M.; Camb.P.S.i.; Camb.U.; Dub.T.C.i.; Edinb.R.S.;  
Edinb.U.; Glasg.U.; N.H.M.; Oxon.B.; R.S.; U.C.L.
- Camb. (M.) Mth. M. ....** The Mathematical Monthly; Runkle. Cambridge (Massachusetts).  
1859—61. B.M.; Camb.U.; Oxon.B.; P.O.; R.A.S.i.; R.S.; U.C.L.  
*See Camb. (U.S.) Mth. M.*
- Camb. Mth. J. ....** The Cambridge Mathematical Journal. London.  
1839—45. B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.U.;  
Glasg.U.; Math.S.i.; Oxon.B.i.; R.S.; U.C.L.
- Camb. Ph. S. P. ....** Proceedings of the Cambridge Philosophical Society. Cambridge.  
1866— B.M.i.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.;  
Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.;  
I.C.E.; Linn.S.i.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.;  
P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.
- Camb. Ph. S. T. ....** Transactions of the Cambridge Philosophical Society. Cambridge.  
1822— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.i.;  
Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.C.E.i.;  
Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.;  
R.S.; S.K.; U.C.L.
- Cambrai Mm.....** Mémoires de la Société d'Émulation de Cambrai. Cambrai.
- Cambrai Mm. S. Ém. ...** 1808— B.M.i.; Camb.U.i.; Oxon.B.; R.S.i.
- Cambrai S. Ém. Mm. ...**
- Camb. (U.S.) Mth. M. ...** *See Camb. (M.) Mth. M.*
- Caradoc FC. T. ....** Transactions of the Caradoc and Severn Valley Field Club.  
Shrewsbury.  
1893— N.H.M.
- Card. Nt. S. T.....** Cardiff Naturalists' Society. Reports and Transactions. Cardiff.  
1868— B.M.i.; Camb.U.i.; Dub.R.D.S.; Geol.M.i.; Geol.S.;  
Glasg.P.S.i.; Linn.S.; N.H.M.; Oxon.B.i.; R.S.i.

## List of Serial Publications

- Carl Rpm.**..... Repertorium für physikalische Technik, für mathematische und astronomische Instrumentenkunde; Carl. München.  
1865—91. B.M.; Camb.U.i.; Dub.N.L.I.i.; I.CE.i.; Oxon.R.; P.O.; R.S.; S.K.  
*See Exner Rpm.*
- Časopis** ..... Časopis pro Pěstování Matematiky a Fysiky. Prag.  
1872— B.M.
- Catania Ac. Gioen. At.**... Atti dell' Accademia Gioenia di Scienze Naturali in Catania. Catania.  
1825— B.M.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; Math.S.i.; N.H.M.; Oxon.B.; R.S.; S.K.i.  
*See Catania At. Ac. Gioen.*
- Catania Ac. Gioen. Bil.**... Bulletino mensile della Accademia Gioenia di Scienze Naturali in Catania. Catania.  
1888— Dub.R.I.A.; Edinb.R.S.; Math.S.i.; N.H.M.; R.S.
- Catania At. Ac. Gioen.**... *See Catania Ac. Gioen. At.*
- Cattaneo Bb. Farm.** ..... Biblioteca di Farmacia, Chimica, etc.; Cattaneo. Milan.  
1834—45. B.M.
- Cattaneo G. Farm.**..... Giornale di Farmacia, etc.; Cattaneo. Milan.  
1824—33. B.M.
- C. CB.** ..... Chemisches Central-Blatt. Leipzig.  
1856— Camb.U.i.; Chem.S.i.; N.H.M.; Oxon.R.; Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.
- CE. I. P.**..... Minutes of Proceedings of the Institution of Civil Engineers, containing Abstracts of the Papers and of the Discussions. London.  
1837— B.M.; Camb.P.S.; Camb.U.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; Oxon.B.; Oxon.R.i.; P.O.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- See I. CE. P.*
- CE. I. T.**..... Transactions of the Institution of Civil Engineers. London.  
1836—42. B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Edinb.R.S.; Geol.S.; Glasg.U.; I.CE.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; U.C.L.i.
- See I. CE. T.*
- Ceylon As. S. J.** ..... Journal of the Ceylon Branch of the Royal Asiatic Society. Colombo.  
1845— B.M.; N.H.M.i.; Oxon.B.; R.Geogr.S.i.
- Cg. Int. Chron.** ..... Congrès International de Chronometrie. Comptes Rendus des Travaux, Procès-Verbaux, Rapports et Mémoires. Paris.  
1889, 1900. Camb.U.; R.S.i.; S.K.
- C. Gz.** ..... Chemical Gazette. London.  
1842—59. B.M.; Camb.U.; Chem.S.; Dub.T.C.i.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.; P.O.i.; S.K.; U.C.L.
- Chambéry Mm. Ac. Sav.** Mémoires de la Société Académique de Savoie. Chambéry.  
1825— Camb.U.; Dub.R.I.A.; Dub.T.C.; N.H.M.; Oxon.B.; R.S.i.  
*See Sav. Ac. Mm. and Sav. Mm. Ac.*
- Charente-Inf. S. Sc. A.**... Académie de La Rochelle. Société des Sciences Naturelles de la Charente-Inférieure. Annales. La Rochelle.  
1856— N.H.M.i.
- Chemist** ..... The Chemist. London.  
1840—58. B.M.; Camb.U.i.; Chem.S.; Dub.T.C.i.; I.CE.i.; Oxon.B.; Pharm.S.; P.O.; R.S.; S.K.i.
- Chemnitz B.**..... Bericht der Naturwiss. Gesellsch. zu Chemnitz. Chemnitz.  
1859— Edinb.R.S.i.; N.H.M.; R.S.i.
- Cherb. Mm. S. Ac.**..... Mémoires de la Société Académique de Cherbourg. Cherbourg.  
1833— B.M.; Camb.U.i.; Edinb.R.S.i.; N.H.M.i.; Oxon.B.i.
- Cherb. Mm. S. Sc.** ..... Mémoires de la Société Impériale des Sciences Naturelles de Cherbourg. Cherbourg.
- Cherb. S. Sc. Mm.** ..... }  
**Cherb. S. Sc. Nt. Mm.** ... } 1852— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; I.CE.; Linn.S.; N.H.M.; R.A.S.i.; R.S.; S.K.
- Chile A. Un.**..... Anales de la Universidad de Chile. Santiago de Chile.  
1843— B.M.i.; Dub.T.C.; Glasg.U.i.; N.H.M.i.; Oxon.B.i.; R.Geogr.S.i.
- See Santiago de Chile Un. A.*
- Chili S. Sc. Act.** ..... Actes de la Société Scientifique du Chili (Sociedad científica de Chile). Santiago.  
1892— B.M.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.; Linn.S.i.; N.H.M.; R.S.i.

## List of Serial Publications

- Christiania F.** ..... Forhandlinger i Videnskabs-Selskabet i Christiania. Christiania.  
1859— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.;  
Geol.S.i.; Glasg.P.S.; N.H.M.; Oxon.B.; R.Geogr.S.i.; R.S.;  
U.C.L.i.
- Christiania Skr. (Mth.-  
Nt. Kl.)** ..... Skrifter udgivne af Videnskabselskabet i Christiania. Mathe-  
matiske-Naturvidenskabelig Klasse. Christiania.  
1894— B.M.; Camb.P.S.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.P.S.;  
N.H.M.; Oxon.B.; R.Geogr.S.; R.S.; U.C.L.i.
- Ciel et Terre** ..... Ciel et Terre. Revue populaire d'Astronomie, de Météorologie et de  
Physique du Globe. Bruxelles.  
1881— B.M.; Edinb.R.S.i.; R.A.S.
- Cincin. S. NH. J.** ..... The Journal of the Cincinnati Society of Natural History.  
Cincinnati.  
1878— B.M.; Camb.P.S.; Edinb.R.S.; Geol.S.i.; N.H.M.; R.S.
- Civing.** ..... Der Civiingenieur: Zeitschrift für das Ingenieurwesen. Freiberg,  
Leipzig.  
1854—96. B.M.; Camb.U.i.; Dub.R.I.A.i.; I.CE.; P.O.
- C. N.** ..... The Chemical News and Journal of Physical Science. London.  
1860— Camb.P.S.; Camb.U.i.; Chem.S.; Dub.N.L.I.i.; Dub.R.D.S.i.;  
Dub.R.C.S.i.; Edinb.U.; Geol.M.; Geol.S.i.; Glasg.P.S.; I.CE.;  
N.H.M.; Oxon.B.i.; Oxon.R.; Pharm.S.; P.O.; R.S.; S.K.;  
U.C.L.i.
- Cn. I. P.** ..... Proceedings of the Canadian Institute, Toronto. Toronto.  
1879—90; 1897— *Continuation of:* The Canadian Journal, 1853—  
78. B.M.; Camb.P.S.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.i.;  
Edinb.U.; Geol.S.; Glasg.P.S.; I.CE.i.; Linn.S.; Math.S.i.;  
N.H.M.; Oxon.B.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.
- Cn. J.** ..... The Canadian Journal of Industry, Science, and Art. Toronto.  
1853—78. *Continued as:* Proceedings of the Canadian Institute,  
1879— B.M.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.; I.CE.;  
N.H.M.; P.O.; R.A.S.i.; R.Geogr.S.; R.S.
- Cn. Ntlist.** ..... The Canadian Naturalist and Quarterly Journal of Science, with the  
Proceedings of the Natural History Society of Montreal. Montreal.  
1857—83. *Continued as:* The Canadian Record of Science, 1884—  
B.M.; Camb.U.i.; Edinb.R.S.; Geol.S.; Glasg.U.i.; Linn.S.;  
N.H.M.; Oxon.B.i.; Oxon.R.; P.O.; R.S.
- Cn. Rc. Sc.** ..... The Canadian Record of Science, including the Proceedings of the  
Natural History Society of Montreal, and replacing the Canadian  
Naturalist. Montreal.  
1884— *Continuation of:* The Canadian Naturalist, 1857—83.  
B.M.; Camb.U.i.; Dub.R.D.S.; Edinb.R.S.; Geol.S.; Linn.S.;  
N.H.M.; Oxon.B.i.; Oxon.R.; R.S.; S.K.i.
- Cn. R. S. P. & T.** ..... Proceedings and Transactions of the Royal Society of Canada.  
Montreal.  
1883— Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.i.; Dub.R.I.A.i.;  
Dub.T.C.i.; Edinb.R.S.; Geol.M.i.; Geol.S.; Glasg.P.S.; Glasg.U.;  
Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.  
S.i.; R.S.; S.K.; U.C.L.
- Coimbra I.** ..... O Instituto, jornal scientifico e litterario; Forjaz. Coimbra.  
1853— B.M.; R.Geogr.S.i.
- Colmar S. H. Nt. Bl.** ... Bulletin de la Société d'Histoire Naturelle de Colmar. Colmar.  
1860—85. N.H.M.
- Colo. Sc. S. P.** ..... Proceedings of the Colorado Scientific Society. Denver.  
1883— Camb.P.S.i.; Chem.S.i.; Edinb.R.S.; Geol.S.i.; Glasg.P.S.;  
N.H.M.; P.O.
- Con. des Temps** ..... Connaissance des Temps, à l'usage des Astronomes et des Navigateurs.  
Paris.  
1679— B.M.i.; Camb.U.; Dub.T.C.; Glasg.U.i.; I.CE.i.; Oxon.B.;  
R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.
- Conn. Ac. T.** ..... Transactions of the Connecticut Academy of Arts and Sciences.  
New Haven.  
1866— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.;  
Glasg.P.S.; Linn.S.; Math.S.i.; N.H.M.; Oxon.R.; P.O.; R.A.S.;  
R.Geogr.S.i.; R.S.; S.K.
- Córd. Ac. Bl.** ..... Boletín de la Academia Nacional de Ciencias Exactas existente en la  
Universidad de Córdoba. Buenos Aires.  
1874— Chem.S.i.; Dub.R.D.S.i.; Edinb.R.S.i.; N.H.M.;  
R.S.



## List of Serial Publications

- Cornwall Gl. S. T.** ..... Transactions of the Royal Geological Society of Cornwall. Penzance.  
1818— B.M.i.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Geol.M.;  
Geol.S.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.;  
R.S.; S.K.i.; U.C.L.i.
- Cornwall Pol. S. Rp.** ..... Reports and Transactions of the Royal Polytechnic Society of  
Cornwall. Falmouth.
- Cornwall Pol. S. T.** ..... { 1833— B.M.; Camb.U.i.; Dub.R.D.S.; Edinb.R.S.i.; Geol.S.i.;  
Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.B.i.;  
P.O.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- Cornwall R. I. J.** ..... Journal of the Royal Institution of Cornwall. Truro.  
1864— B.M.; Camb.U.i.; Dub.R.D.S.; Edinb.R.S.; Geol.S.i.;  
Glasg.P.S.i.; I.CE.i.; N.H.M.; Oxon.B.i.; P.O.; R.A.S.i.; R.S.i.;  
S.K.; U.C.L.i.
- Cosmos** ..... Cosmos. Revue Encyclopédique Hebdomadaire des Progrès des  
Sciences; Moigno. Paris.  
1852—70. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; I.CE.i.;  
N.H.M.; Oxon.B.; P.O.; R.A.S.i.; R.S.; S.K.i.  
*See Moigno Cosmos.*
- Cotteswold Cl. P.** ..... Proceedings of the Cotteswold Naturalists' Field Club. London,  
Gloucester.  
1853— B.M.i.; Camb.U.i.; Geol.M.; Geol.S.; N.H.M.; R.S.; U.C.L.
- C. R.** ..... Comptes Rendus hebdomadaires des Séances de l'Académie des  
Sciences. Paris.  
1835— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.;  
Edinb.R.S.i.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.i.;  
Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.i.; Pharm.  
S.i.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.
- Crc. Ac. Sc. Bll.** ..... Bulletin International de l'Académie des Sciences de Cracovie.  
Cracovie.  
1889— B.M.; Camb.U.; Chem.S.; Dub.R.I.A.i.; Edinb.R.S.;  
Geol.S.; Glasg.U.; N.H.M.; Oxon.B.; Oxon.R.i.; R.A.S.i.;  
R.S.; U.C.L.i.
- Crelle J.** ..... Journal für die reine und angewandte Mathematik; Crelle. Berlin.  
1826— B.M.; Camb.U.; Dub.N.L.i.; Dub.T.C.; Edinb.R.S.;  
Edinb.U.; Glasg.U.; I.CE.i.; Math.S.i.; Oxon.B.(R.); R.S.;  
S.K.i.; U.C.L.  
*See Crelle J. Mth.*
- Crelle J. Bauk.** ..... Journal für die Baukunst; Crelle. Berlin.  
1829—51. Camb.U.; Glasg.U.; P.O.
- Crelle J. Mth.** ..... *See Crelle J.*
- C. S. J.** ..... The Quarterly Journal of the Chemical Society of London. London.  
1849— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.E.C.S.;  
Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.M.i.;  
Geol.S.; Glasg.P.S.; I.CE.; N.H.M.i.; Oxon.B.; Oxon.R.i.;  
Pharm.S.; P.O.; R.S.; S.K.; U.C.L.
- C. S. P.** ..... Proceedings of the Chemical Society. London.  
1885— B.M.; Camb.P.S.; Camb.U.i.; Chem.S.; Dub.R.D.S.;  
Dub.R.I.A.; Edinb.R.S.; Geol.M.i.; Glasg.U.; N.H.M.i.; Oxon.R.;  
Pharm.S.; P.O.; S.K.; U.C.L.
- Cuyper Rv. Un.** ..... Revue Universelle des Mines, de la Métallurgie, etc.; de Cuyper.  
Paris et Liège.  
1857— B.M.; Camb.U.; Dub.R.I.A.i.; Glasg.P.S.i.; Glasg.U.i.;  
I.CE.i.; N.H.M.; P.O.; S.K.  
*See Rv. Un. Mines.*
- C. Ztg.** ..... Chemiker-Zeitung. Central-organ für Chemiker, Apotheker, Tech-  
niker, Ingenieure, Fabrikanten. Cöthen.  
1877— Chem.S.i.; P.O.i.; S.K.i.
- Cztg. Opt.** ..... Central-Zeitung für Optik und Mechanik. Leipzig.  
1880— Edinb.U.i.; P.O.i.; R.S.i.
- Danzig N. Schr.** ..... Neueste Schriften der Naturforschenden Gesellschaft in Danzig.  
Danzig.  
1820—62. *Continued as:* Schriften, etc., 1863— B.M.i.; Camb.U.i.;  
Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; Oxon.R.i.; R.S.; S.K.i.
- Danzig Schr.** ..... Schriften der Naturforschenden Gesellschaft in Danzig. Danzig.  
1863— *Continuation of:* Neueste Schriften, etc., 1820—62.  
Camb.P.S.; Camb.U.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.  
R.S.i.; Linn.S.i.; N.H.M.; Oxon.R.i.; R.S.; S.K.i.

## List of Serial Publications

- Dax S. Borda Bll.** ..... Bulletin de la Société de Borda à Dax. Dax.  
1876— N.H.M.; U.C.L.i.
- D. C. Gs. B.** ..... Berichte der Deutschen Chemischen Gesellschaft. Berlin.  
1868— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.;  
Glasg.P.S.; Glasg.U.; N.H.M.; Oxon.R.; Pharm.S.; P.O.;  
R.S.; S.K.; U.C.L.i.  
*See Berl. B.*
- Delft Éc. Pol. A.** ..... Annales de l'École Polytechnique de Delft. Leide.  
1885—97. Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.  
R.I.A.; Edinb.R.S.; Math.S.; R.A.S.; R.S.; S.K.
- Denison Un. Sc. Lb. Bll.** ..... Bulletin of the Scientific Laboratories of Denison University.  
Granville, Ohio.  
1885— B.M.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.; N.H.M.;  
P.O.; S.K.i.
- Des Moines Anal.** ..... The Analyst: a monthly Journal of Pure and Applied Mathematics.  
Des Moines, Iowa.  
1874—97. Camb.U.; Edinb.R.S.; R.S.
- Devon. As. T.** ..... Reports and Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art. Plymouth and London.  
1862— Camb.U.i.; Geol.M.; Geol.S.; Linn.S.; N.H.M.; Oxon.B.;  
Oxon.R.i.; P.O.; R.S.; S.K.
- D. Gl. Gs. Z.** ..... Zeitschrift der Deutschen Geologischen Gesellschaft. Berlin.  
1849— B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.;  
Glasg.U.i.; N.H.M.; Oxon.R.; R.S.i.; S.K.i.
- Dijon Ac. Mm.** ..... Mémoires de l'Académie des Sciences, Arts, et Belles-lettres de  
Dijon. Dijon.  
**Dijon Ac. Sc. Mm.** ..... 1769— B.M.i.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.;  
Edinb.R.S.i.; Geol.S.i.; N.H.M.; Oxon.B.i.; R.A.S.; R.Geogr.  
S.i.; R.S.i.; S.K.i.  
**Dijon Mm. Ac.** ..... {
- Dijon Ac. Sé.** ..... Séances publiques de l'Académie des Sciences, Arts, et Belles-lettres  
de Dijon. Dijon.  
**Dijon Sé. Ac.** ..... {  
1810—29. B.M.i.; N.H.M.
- Dingler** ..... Polytechnisches Journal; Dingler. Stuttgart.  
1820— B.M.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.C.S.i.;  
Dub.R.D.S.i.; Edinb.R.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.;  
P.O.; R.S.i.; S.K.
- D. Mth. Vr. Jbr.** ..... Jahresbericht der deutschen Mathematiker-Vereinigung. Berlin,  
Leipzig.  
1890— Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Math.S.i.; Oxon.B.;  
R.S.
- D. Nf. B.** ..... Bericht über die Versammlung der Deutschen Naturforscher und  
Aerzte.  
1822—83. Irregular, *see* Tageblatt. Camb.U.i.; Geol.S.i.; N.H.M.i.;  
Oxon.R.i.; R.S.i.; S.K.i.  
*See D. Nf. Vsm. B.*
- D. Nf. Tbl.** ..... Tageblatt der...Versammlung Deutscher Naturforscher und Aerzte.  
1836—89. Irregular, *see* B. and Vh. Camb.U.; Geol.S.i.; N.H.M.;  
Oxon.R.i.
- D. Nf. Vh.** ..... Verhandlungen der Gesellschaft Deutscher Naturforscher und Aerzte.  
Leipzig.  
1890— *Continuation of:* Bericht, Tagebl. etc., 1822—89. Camb.U.;  
N.H.M.; Oxon.R.
- D. Nf. Vsm. B.** ..... *See D. Nf. B.*
- Dn. Vd. Selsk. Skr.** ..... Det Kongelige Danske Videnskabernes Selskabs Skrivter. Kiöbenhavn.  
1801—18. B.M.; Camb.P.S.i.; Camb.U.; Edinb.R.S.; N.H.M.;  
Oxon.B.; R.S.  
*See Kiöb. Dn. Vd. Selsk. Skr.*
- Donders Arch.** ..... Archiv für die Holländischen Beiträge zur Natur- und Heilkunde;  
Donders. Utrecht.  
1858—64. B.M.; Camb.U.; N.H.M.; R.S.
- Dorpat Sb.** ..... Sitzungsberichte der Naturforscher-Gesellschaft zu Dorpat. Dorpat.  
1861— Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.; N.H.M.; R.S.i.; S.K.i.
- Dorset FC. F.** ..... Proceedings of the Dorset Natural History and Antiquarian Field  
Club. Sherborne.  
1877— B.M.; Camb.U.i.; Geol.S.i.; Linn.S.; N.H.M.; Oxon.B.i.
- Doubs S. Mm.** ..... Mémoires et Comptes Rendus de la Société [Libre] d'Emulation  
du Doubs. Besançon.  
1841— B.M.; N.H.M.i.

## List of Serial Publications

- D. Ps. Gs. Vh.** ..... Verhandlungen der Deutschen Physikalischen Gesellschaft. Leipzig. 1899— *Continuation of*: Verhandlungen der Physikalischen Gesellschaft in Berlin, 1882—98. Camb.P.S.; Camb.U.; Edinb.R.S.; Glasg.U.; N.H.M.; Oxon.B.(R.); P.O.; R.A.S.; R.S.; S.K.; U.C.L.i.
- Dresden Isis Sb.** ..... Sitzungsberichte der Naturwissenschaftlichen Gesellschaft Isis in Dresden. Dresden. 1861— Camb.U.i.; Dub.T.C.; Geol.S.; N.H.M.; S.K.  
See **Dresden Sb. Isis.**
- Dresden Mt. Pol. Schule** ..... Mittheilungen der K. Sächs. Polytechnischen Schule. Leipzig. 1864—73. B.M.
- Dresden Sb. Isis** ..... See **Dresden Isis Sb.**
- Dubl. Gl. S. J.** ..... Journal of the Geological Society of Dublin. Dublin. 1838—65. *Continued as*: Journal of the Royal Geological Society of Ireland, 1867—87. B.M.; Camb.U.i.; Dub.N.L.I.; Dub.R.C.S.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.B.i.; R.Geogr.S.i.; R.S.
- Dubl. J. Md. C. Sc.** ..... Dublin Journal of Medical and Chemical Science. Dublin. 1832—45. B.M.; Camb.U.i.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.T.C.i.; Pharm.S.i.
- Dubl. Ph. J.** ..... The Dublin Philosophical Journal and Scientific Review. Dublin. 1825—26. B.M.; Dub.R.D.S.; Dub.T.C.; Edinb.R.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.S.i.
- Dubl. R. S. J.** ..... Journal of the Royal Dublin Society. Dublin. 1856—75. B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.
- Dubl. S. J.** ..... Transactions and Journal of the Dublin Society. Dublin. 1799—1810. B.M.; Dub.N.L.I.; Dub.R.D.S.; Dub.T.C.; Geol.S.i.; N.H.M.; Oxon.B.i.; R.S.; S.K.  
See **Dubl. S. T.**
- Dubl. S. Sc. P.** ..... The Scientific Proceedings of the Royal Dublin Society. Dublin. 1877— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
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- Dubl. S. T.** ..... See **Dubl. S. J.**
- Eastbourne NH. S. Pp. (& T.)** ..... { Papers (Transactions) of the Eastbourne Natural History Society with Annual Report.  
1869— Geol.S.i.; N.H.M.i.; R.S.i.; S.K.i.
- Eastbourne NH. S. T.** ...
- Éclair. Élect.** ..... L'Éclairage Électrique. Paris. 1894— B.M.; Glasg.U.i.; I.CE.; P.O.
- Edinb. Bt. S. T.** ..... Transactions of the Botanical Society of Edinburgh. Edinburgh. 1844— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.; Pharm.S.; R.S.
- Edinb. Gl. S. T.** ..... Transactions of the Edinburgh Geological Society. Edinburgh. 1868— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.; N.H.M.; P.O.; R.Geogr.S.; R.S.; U.C.L.
- Edinb. J. Nt. Gg. Sc.** ..... The Edinburgh Journal of Natural and Geographical Science. Edinburgh. 1830—31. B.M.; Camb.U.; Edinb.R.S.; Linn.S.; N.H.M.; Oxon.B.i.; R.Geogr.S.; R.S.; S.K.
- Edinb. J. Sc.** ..... The Edinburgh Journal of Science, exhibiting a view of the progress of discovery in Natural Philosophy, Chemistry, Mineralogy, Geology, Botany, etc.; David Brewster. Edinburgh. 1824—1832. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.; R.S.; S.K.



## List of Serial Publications

- Edinb. Mm. Wern. S. ...** Memoirs of the Wernerian Natural History Society. Edinburgh. 1808—89. B.M.; Camb.U.i.; Dub.R.D.S.; Edinb.R.S.; Geol. S.i.; Linn.S.; N.H.M.; Oxon.B.i.; Oxon.R.; R.S.; S.K.; U.C.L.i.
- Edinb. Mth. S. P. ....** See **Edinb. Wern. S. Mm.**  
Proceedings of the Edinburgh Mathematical Society. London and Edinburgh.  
1883— B.M.; Camb.P.S.; Camb.U.; Edinb.R.S.; Edinb.U.; Glasg.U.; Math.S.; R.S.i.
- Edinb. N. Ph. J. ....** The Edinburgh New Philosophical Journal, exhibiting a view of the progressive Improvements, etc. in the Sciences, etc.; Robert Jameson. Edinburgh.  
1826—64. *Continuation of:* The Edinburgh Philosophical Journal, 1819—26. B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.i.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.i. N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.i.; R.Geogr. S.i.; R.S.; S.K.
- Edinb. Ph. J. ....** The Edinburgh Philosophical Journal, exhibiting a view of the Progress of Discovery in Natural Philosophy, etc.; David Brewster and Robert Jameson. Edinburgh.  
1819—26. *Continued as:* The Edinburgh New Philosophical Journal, 1826—64. B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Edinb. P. R. S. ....** { Proceedings of the Royal Society of Edinburgh. Edinburgh.  
**Edinb. R. S. P. ....** { 1845— B.M.i.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Edinb.R.S.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; Pharm.S.i.; P.O.i.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Edinb. R. S. T. ....** { Transactions of the Royal Society of Edinburgh. Edinburgh.  
1788— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.; Dub. R.I.A.; Edinb.R.S.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon. R.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.
- Edinb. Sc. S. Arts P. ....** { See **Edinb. T. R. S.**  
**Edinb. Sc. S. Arts T. ....** { Transactions of the Royal Scottish Society of Arts. Edinburgh.  
1841— B.M.i.; Camb.U.; Dub.R.D.S.; Edinb.R.S.; Edinb.U.; Glasg.P.S.; Glasg.U.; I.CE.; P.O.; R.S.; S.K.
- Edinb. T. R. S. ....** See **Edinb. T. Sc. S. Arts and Sc. S. Arts T.**  
**Edinb. T. Sc. S. Arts. ....** See **Edinb. R. S. T.**  
**Edinb. Wern. S. Mm. ...** See **Edinb. Mm. Wern. S.**
- Educ. Times ....** The Educational Times, and Journal of the College of Preceptors. London.  
1847— B.M.; Camb.P.S.i.; Camb.U.i.; Dub.N.L.I.; Glasg.U.i.; Math.S.i.; Oxon.B.i.; Oxon.R.i.; R.S.i.; S.K.i.
- Elect. ....** The Electrician. London.  
1862— B.M.i.; Camb.P.S.i.; Camb.U.i.; Dub.N.L.I.i.; Dub. R.C.S.i.; Edinb.R.S.i.; Edinb.U.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Oxon.B.i.; Oxon.R.i.; P.O.; R.S.i.; S.K.; U.C.L.i.
- Elect. Rv. ....** The Electrical Review. London.  
1892— *Continuation of:* The Telegraphic Journal and Electrical Review, 1872—91. B.M.; Camb.U.; Dub.N.L.I.; Glasg.P.S.; Glasg.U.; I.CE.; P.O.; R.S.; S.K.
- Elekttech. Z. ....** Elektrotechnische Zeitschrift. Berlin, München.  
1880— B.M.; Glasg.U.; I.CE.; P.O.; S.K.i.
- Emden Nf. Gs. Jbr. ....** Jahresbericht.....der Naturforschenden Gesellschaft in Emden. Emden.  
1837— Dub.R.I.A.; R.S.
- Eng. S. T. ....** Transactions of the Society of Engineers. London.  
1860— B.M.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Oxon.B.; P.O.; R.S.i.; U.C.L.
- Ens. Mth. ....** L'Enseignement Mathématique. Revue Internationale. Paris.  
1899— Math.S.; S.K.
- Erdél. Mz. ....** Erdélyi Múzeum. [The Transylvanian Museum.] Kolozsvár [Klausenburg].  
1874—82. Dub.R.I.A.; N.H.M.; R.S.

## List of Serial Publications

- Erdm. J. Pr. C.** ..... Journal für praktische Chemie; Erdman, etc. Leipzig.  
1834— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.;  
Dub.R.D.S.i.; Edinb.R.S.; Glasg.P.S.i.; Glasg.U.; N.H.M.;  
Oxon.B.; Oxon.R.; Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.  
*See J. Pr. C.*
- Erdm. J. Tech. C.** ..... Journal für technische und ökonomische Chemie; Erdman. Leipzig.  
1828—33. B.M.; Chem.S.; N.H.M.; P.O.; R.S.; S.K.
- Erfurt N. Acta** ..... Nova Acta Academiæ Electoralis Moguntinæ Scientiarum utilium  
quæ Erfurti est. Erfurti.  
1799—1809. B.M.i.; N.H.M.; Oxon.B.i.; R.S.
- Erlang. Ps. Md. S. Sb.** ... Sitzungsberichte der Physikalisch-Medicinischen Societät zu Er-  
langen. Erlangen.
- Erlang. Sb. Ps. Md. S.** ... { 1864— B.M.; Camb.P.S.; Dub.R.D.S.; Edinb.R.S.i.; Glasg.U.i.;  
Linn.S.i.; Math.S.i.; N.H.M.; R.S.i.
- Erlenmeyer Z.** ..... Zeitschrift für Chemie und Pharmacie etc.; Erlenmeyer. Erlangen,  
Heidelberg.  
1860—71. B.M.; Camb.U.; Chem.S.; N.H.M.; Oxon.R.i.; S.K.i.
- Erman Arch. Rs.** ..... Archiv für wissenschaftliche Kunde von Russland; Erman. Berlin.  
1841—67. B.M.; Camb.U.; N.H.M.; Oxon.B.; R.Geogr.S.; R.S.i.;  
S.K.
- Essex I. P.** ..... Proceedings of the Essex Institute. Salem (Mass.).  
1856—71. B.M.i.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.i.; Linn.  
S.i.; N.H.M.; Oxon.R.i.; R.S.; S.K.
- Eure Rec. S. Ag.** ..... Recueil de la Société d'Agriculture, Sciences, Arts, et Belles-lettres  
du département de l'Eure. Evreux.  
1830—39. B.M.; Camb.U.; Oxon.B.; R.S.  
*See Eure S. Ag. Rec.*
- Eure Rec. Tr.** ..... Recueil des Travaux de la Société Libre d'Agriculture, des Sciences,  
des Arts et des Belles-Lettres du département de l'Eure. Evreux.  
1841— B.M.; Camb.U.; R.S.
- Eure S. Ag. Rec.** ..... *See Eure Rec. S. Ag.*
- Évk.** ..... A'Magyar Tudós Társaság' Évkönyvei. Pest. *Continued as:*  
A'Magyar Tudományos Akademia Évkönyvei. Budá.  
1833—89. B.M.; Edinb.R.S.i.; Geol.S.i.; N.H.M.; Oxon.B.;  
R.A.S.i.; R.S.; S.K.i.; U.C.L.i.
- Exner Rpm.** ..... Repertorium der Physik; Exner. München, Leipzig.  
1865—91. B.M.; Camb.U.i.; Dub.N.L.I.i.; Edinb.U.; I.CE.i.;  
Oxon.R.; P.O.; R.S.; S.K.  
*See Carl Rpm.*
- Fed. I. Mn. E. T.** ..... Transactions of the Federated Institution of Mining Engineers.  
Newcastle-upon-Tyne.  
1889—98. *Continued as:* Transactions of the Institution of Mining  
Engineers, 1898— Camb.U.; Edinb.R.S.i.; Geol.M.; Geol.S.;  
Glasg.P.S.; Glasg.U.; I.CE.; Oxon.B.; Oxon.R.i.; P.O.; S.K.
- Férussac Bil. Sc. Mth.** ... Bulletin des Sciences Mathématiques, Astronomiques, Physiques, et  
Chimiques; Baron de Férussac. Paris.  
1824—31. B.M.; Edinb.U.i.; Geol.S.; Glasg.U.i.; Oxon.R.; P.O.;  
U.C.L.
- Finist. S. Sc. Bil.** ..... Bulletin de la Société d'Études Scientifiques du Finistère. Morlaix.  
1879— N.H.M.
- Firenze Ac. Georg. At.** ... Atti della R. Accademia economico-agraria dei Georgofili. Firenze.  
1817— *Continuation of:* Atti della (Real) Società Economica di  
Firenze ossia de' Georgofili, 1791—1812. B.M.; Camb.U.; Dub.  
T.C.i.; Edinb.R.S.i.; Oxon.B.  
*See Firenze At. Ac. Georg.*
- Firenze A. Ms. Imp.** ... Annali del Museo Imperiale di Fisica e Storia Naturale di Firenze.  
Firenze.  
1808—10. B.M.; Camb.U.i.; N.H.M.; Oxon.B.; R.A.S.; R.S.i.; S.K.
- Firenze At. Ac. Georg.** ... *See Firenze Ac. Georg. At.*
- Firenze S. Georg. At.** ... Atti della (Real) Società Economica di Firenze ossia de' Georgofili.  
Firenze.  
1791—1812. *Continued as:* Atti della R. Accademia economico-  
agraria dei Georgofili, 1817— B.M.; Camb.U.
- Föl. Közl.** ..... Földtani Közlöny. Havi folyóirat kiadja a Magyarhoni Földtani  
Társulat. (Geologische Mittheilungen.) Zeitschrift der Ungar-  
ischen Geologischen Gesellschaft. Budapest.  
1872— B.M.; Camb.U.i.; Geol.M.; Geol.S.; N.H.M.; R.S.i.; S.K.i.

## List of Serial Publications

- Forsh. Ag.-Ps.**..... Forschungen auf dem Gebiete der Agrikultur-Physik. Heidelberg. 1878—98. Chem.S.; P.O.
- Förster Al. Bauztg.** ..... Allgemeine Bauzeitung; Förster. Wien. 1836— B.M.; Camb.U.; I.CE.i.; P.O.
- Fr. An. I. Prv.**..... Annuaire de l'Institut des Provinces et des Congrès Scientifiques de France. Paris, Caen, etc. 1846— B.M.i.; Camb.U.i.; N.H.M.i.; Oxon.B.i.; R.S.i.  
See **Fr. I. Prv. An.**
- Franklin I. J.** ..... Journal of the Franklin Institute of the State of Pennsylvania. Philadelphia. 1828— B.M.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Geol.S.i.; Glasg.P.S.i.; I.CE.; Oxon.B.; P.O.; R.A.S.i.; R.Geogr.S.; R.S.; U.C.L.i.
- Fr. Cg. Sc.** ..... Sessions des Congrès Scientifiques de France. 1833—79. B.M.; Camb.U.; N.H.M.
- Freiburg B.** ..... Berichte über die Verhandlungen der Naturforschenden Gesellschaft zu Freiburg i. B. Freiburg i. B. 1855— B.M.; Camb.U.i.; Dub.R.I.A.; Linn.S.i.; N.H.M.; Oxon.R.; R.S.; S.K.
- Fresenius Z.**..... Zeitschrift für Analytische Chemie; Fresenius. Wiesbaden. 1862— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.; Glasg.P.S.; N.H.M.; Oxon.R.; Pharm.S.; P.O.; R.S.; S.K.
- Fr. I. Prv. An.** ..... See **Fr. An. I. Prv.**
- Fr. I. Prv. Mm.** ..... Mémoires de l'Institut des Provinces de France:—Sciences Physiques et Naturelles. Paris, Caen, etc. 1859. B.M.  
See **Fr. Mm. I. Prv.**
- Frkf. a. M. Ps. Vr. Jbr.**... { Jahresbericht des Physikalischen Vereins zu Frankfurt am Main.  
**Frkf. Jbr. Ps. Vr.** { Frankfurt am Main. 1838— B.M.i.; Glasg.U.i.; R.S.i.; S.K.i.
- Fr. Mm. I. Prv.** ..... See **Fr. I. Prv. Mm.**
- Froriep Not.** ..... Notizen aus dem Gebiete der Natur- und Heilkunde; Froriep. Erfurt, Weimar. 1821—62. B.M.i.; Camb.U.i.; Glasg.U.i.; N.H.M.; Oxon.R.i.; R.S.i.
- Fr. S. Ag. Bll.**..... Bulletin des Séances de la Société (Centrale) d'Agriculture de France. Paris. 1837— P.O.i.
- Fr. S. Ag. Mm.** ..... Mémoires d'Agriculture, d'Économie rurale et domestique publiés par la Société d'Agriculture. Paris. 1801— B.M.; Edinb.R.S.i.; Oxon.B.
- Fr. S. Mn. Bll.** ..... Bulletin de la Société Minéralogique de France. Meulan, Paris. 1878— B.M.; Dub.T.C.; Geol.M.; Geol.S.; N.H.M.; Oxon.R.; R.S.; S.K.
- Fschr. Mth.** ..... Jahrbuch über die Fortschritte der Mathematik. Berlin. 1868— B.M.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Edinb.U.; Glasg.P.S.i.; Glasg.U.; Math.S.; Oxon.R.; R.S.; U.C.L.
- Fschr. Ps.** ..... Die Fortschritte der Physik. Berlin. 1845— Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Edinb.U.; Glasg.U.; I.CE.i.; Oxon.B.(R.); P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.
- Gand. A. Ac.**..... Annales Academiæ Gandavensis. Gandavi. (Ghent.) 1819—31. B.M.; Camb.U.; N.H.M.; Oxon.B.; R.S.
- G. Arcad.** ..... Giornale Arcadico di Scienze, etc. Roma. 1819— B.M.; N.H.M.i.; Oxon.B.
- Gard. Chron.** ..... The Gardener's Chronicle. London. 1841— Camb.U.; Dub.N.L.I.i.; Dub.T.C.i.; Linn.S.; N.H.M.; Oxon.B.; P.O.; S.K.i.
- Gard Mm. Ac.**..... Mémoires de l'Académie du Gard. Nîmes. 1832— B.M.; Camb.U.; Oxon.B.; R.S.i.
- Gauss Resultate** ..... Resultate aus den Beobachtungen des Magnetischen Vereins; Gauss und Weber. Göttingen, Leipzig. 1837—42. B.M.; Camb.U.; Chem.S.; R.S.
- Gehlen J.** ..... Journal für die Chemie und Physik; Gehlen. Berlin. 1806—10. B.M.; Edinb.R.S.; Glasg.U.; N.H.M.; Oxon.R.; R.S.
- Gen. Bll. I. Nt.** ..... Bulletin de l'Institut National Genevois. Genève. 1853— B.M.; Camb.U.; Dub.R.D.S.; N.H.M.; Oxon.B.i.; P.O.i.; R.S.  
See **Gen. I. Nt. Bll.**

# List of Serial Publications

- Gén. Civ.** ..... Le Génie Civil. Revue Générale des Industries Françaises et Etrangères, etc. Paris.  
1880— B.M.; I.CE.; P.O.; S.K.
- Gen. I. Nt. Bll.** ..... See **Gen. Bll. I. Nt.**
- Gen. Mm. S. Ps.** ..... Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. Genève.  
1821— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.U.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; R.A.S.i.; R.Geogr.S.; R.S.; U.C.L.i.
- See **Gen. S. Ps. Mm.**
- Genova Mm. I. Ligure** ... Memorie dell' Istituto Ligure. Genova.  
1806. B.M.; Camb.U.; R.S.
- Genova Mm. S. Md.** ..... Memorie della Società Medica di Emulazione di Genova. Genova.  
1802—04.
- Gen. S. Ps. Mm.** ..... See **Gen. Mm. S. Ps.**
- Gergonne A. Mth.** ..... Annales de Mathématiques, pures et appliquées; Gergonne. Nîmes et Paris.  
1810—31. B.M.; Dub.T.C.; Edinb.U.i.; Glasg.U.i.; Oxon.B.(R.); R.A.S.i.; R.S.; U.C.L.
- Gg. J.** ..... The Geographical Journal. Including the Proceedings of the Royal Geographical Society. London.  
1893— *Continuation of:* Proceedings, etc., 1857—92. B.M.i.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Gg. S. J.** ..... Journal of the Royal Geographical Society of London. London.  
1832—80. B.M.; Camb.P.S.i.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; S.K.
- Gg. S. P.** ..... Proceedings of the Royal Geographical Society of London. London.  
1857—92. *Continued as:* The Geographical Journal, 1893— Camb.P.S.i.; Camb.U.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Gilbert A.** ..... Annalen der Physik; Gilbert. Halle und Leipzig.  
1799—1824. Camb.U.; Chem.S.; Edinb.U.; Glasg.U.i.; N.H.M.; Oxon.B.(R.); P.O.; R.S.; S.K.
- Gill Tech. Rep.** ..... The Technical Repository; Gill. London.  
1822—27. B.M.; Camb.U.; Edinb.R.S.i.; Glasg.U.i.; I.CE.i.; Oxon.B.; P.O.; R.S.i.; S.K.
- Glasg. I. Eng. T.** ..... Transactions of the Institution of Engineers [and Shipbuilders] in Scotland. Glasgow.  
1857— Camb.U.i.; Glasg.U.; I.CE.; P.O.; U.C.L.i.
- See **Glasg. T. I. Eng.**
- Glasg. Ph. S. P.** ..... Proceedings of the [Royal] Philosophical Society of Glasgow. Glasgow.
- Glasg. P. Ph. S.** ..... { 1841— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Geol.M.i.; Geol.S.i.; Glasg.P.S.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.; Pharm.S.i.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- See **Glasg. I. Eng. T.**
- Glasg. T. I. Eng.** ..... See **Glasg. I. Eng. T.**
- Gleanings Sc.** ..... Gleanings in Science. Calcutta.  
1829—31. B.M.; Edinb.R.S.i.; I.CE.i.; N.H.M.; S.K.; U.C.L.i.
- Gl. Mg.** ..... The Geological Magazine or Monthly Journal of Geology. London.  
1864— B.M.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; P.O.i.; R.Geogr.S.; S.K.; U.C.L.
- Gl. S. QJ.** ..... The Quarterly Journal of the Geological Society of London. London.  
1845— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Geol.M.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Gl. Sv. Mm.** ..... Memoirs of the Geological Survey of Great Britain and of the Museum of Economic Geology in London. London.  
1846— Camb.U.; Dub.R.C.S.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.S.; S.K.; U.C.L.
- See **Mm. Gl. Sv.**



## List of Serial Publications

- G. Mt.**..... *Giornale di Matematiche ad uso degli Studenti delle Università Italiane*; Battaglini. Napoli.  
1863— B.M.; Camb.U.; Dub.R.C.S.i.; Dub.R.I.A.i.; Math.S.i.; Oxon.B.; R.S.; U.C.L.i.
- Görl. Ab.** ..... *Abhandlungen der Naturforschenden Gesellschaft zu Görlitz*. Görlitz.  
1827— B.M.; Camb.U.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; N.H.M.; R.S.; S.K.
- Göteb. Hndl.**..... *Göteborgs Kongl. Vetenskaps och Vitterhets Samhälles Handlingar*. Göteborg.  
1850— B.M.; Camb.P.S.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; N.H.M.; R.S.i.
- Gött. Ab.** ..... *Abhandlungen der k. Gesellschaft der Wissenschaften*. Göttingen.  
1843— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; R.S.; U.C.L.i.
- Gött. Cm.** ..... *Commentationes Societatis Regiæ Scientiarum Göttingensis*. Göttinge.  
1778—1808. B.M.i.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.U.i.; N.H.M.; Oxon.B.; R.S.; U.C.L.  
*Commentationes recentiores Societatis, etc.* Göttinge.  
1808—37. B.M.; Camb.U.; Edinb.R.S.i.; Glasg.U.i.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.i.; R.S.; U.C.L.
- Gött. Nr.** ..... *Nachrichten von der k. Gesellschaft der Wissenschaften und der Georg-Augusts-Universität zu Göttingen*. Göttingen.  
1845— B.M.; Camb.P.S.; Camb.U.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Glasg.U.i.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.i.; R.S.
- Gött. Stud. Vr.** ..... { *Studien des Göttingischen Vereins Bergmännischer Freunde*;  
**Gött. Vr. Stud.** ..... { *Haussmann*. Göttingen.  
1824—58. *Geol.S.i.*; R.S.; S.K.
- Gould As. J.**..... *The Astronomical Journal*; Gould. Cambridge, Mass.  
1851—61. B.M.; Camb.U.; Glasg.U.i.; Oxon.B.; Oxon.R.i.; R.A.S.; R.S.; S.K.  
*See As. J.*
- 's Gravenh. I. Ing. Ts.** ... *Tijdschrift van het Koninklijk Instituut van Ingenieurs*. 's Gravenhage.  
1869— B.M.; I.CE.i.
- 's Gravenh. I. Ing. Vh.** .. *Verhandelingen van het Koninklijk Instituut van Ingenieurs*. 's Gravenhage.  
1848— B.M.; I.CE.i.
- Grenoble Ac. Delph. Bil.** *Bulletin de l'Académie Delphinale, ou Société des Sciences et Arts de Grenoble*. Grenoble.  
1846— B.M.; Camb.U.i.; Oxon.B.; R.S.i.
- Gruithuisen N. Analekt.** *Neue Analekten für Erd- und Himmelskunde*. Gruithuisen. München.  
1832—36. B.M.; R.A.S.; R.S.
- Grunert Arch.**..... *Archiv der Mathematik und Physik*; Grunert. Greifswald, Leipzig.  
1841— B.M.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.i.; Edinb.U.; Glasg.U.; Math.S.i.; Oxon.B.(R.); R.S.; U.C.L.i.  
*See Arch. Mth. Ps.*
- G. Teix. J. Sc.**..... *Jornal de Sciencias Mathematicas e Astronomicas*, publicado pelo Dr Francisco Gomes Teixeira. Coimbra.  
1878— Math.S.; R.S.i.
- Gz. C. It.** ..... *Gazzetta Chimica Italiana*. Palermo.  
1871— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.; P.O.; R.S.i.; S.K.
- Haarl. Ms. Teyl. Arch.**... *Archives du Musée Teyler*. Haarlem.  
1866— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.P.S.; N.H.M.; Oxon.R.; R.A.S.; R.S.; S.K.  
*See Harl. Arch. Ms. Teyl.*
- Haarl. Ntk. Vh.** ..... { *Natuurkundige Verhandelingen van de [Bataafsche] Hollandsche*  
**Haarl. Ntk. Vh. Mtsch.**... { *Maatschappij der Wetenschappen te Haarlem*. Haarlem.  
**Haarl. Vh.** ..... { 1799— B.M.; Camb.U.i.; Dub.R.D.S.; *Geol.S.i.*; Glasg.U.i.; N.H.M.; R.S.; S.K.i.
- Haidinger B.** ..... *Berichte über die Mittheilungen von Freunden der Naturwissenschaften in Wien*; Haidinger. Wien.  
1847—51. Camb.U.; Chem.S.i.; Edinb.R.S.; *Geol.S.i.*; Linn.S.; N.H.M.; R.A.S.; R.Geogr.S.; R.S.



# List of Serial Publications

- Hain. Mm. S.** ..... { Mémoires et Publications de la Société des Sciences, des Arts et des  
**Hain. S. Mm.** ..... { Lettres du Hainaut. Mons.  
1839— B.M.; Dub.T.C.i.; N.H.M.; Oxon.B.i.; R.S.i.; S.K.  
**Hall Bij.** ..... { Bijdragen tot de Natuurkundige Wetenschappen; Hall, etc.  
Amsterdam.  
1826—32. B.M.; Camb.U.; N.H.M.; R.S.; S.K.  
**Halle Nf. Gs. B.** ..... { Bericht über die Sitzungen der Naturforschenden Gesellschaft zu  
**Halle Sb. Nf. Gs.** ..... { Halle. Halle.  
1853—92. B.M.; Camb.U.i.; Edinb.R.S.i.; R.S.i.  
**Halle Z.** ..... { Zeitschrift für die gesammten Naturwissenschaften; herausgegeben  
von dem Naturwissenschaftlichen Vereine für Sachsen und  
**Halle Z. Nw.** ..... { Thüringen in Halle; Giebel. Berlin.  
1853— B.M.; Camb.U.i.; Dub.N.L.I.; Dub.R.D.S.i.; Dub.R.I.A.i.;  
Dub.T.C.i.; Edinb.R.S.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.;  
R.S.; S.K.  
**See Z. Nw.**  
**Hamb. Mth. Gs. Mt.** ..... { Mittheilungen der Mathematischen Gesellschaft in Hamburg. Leipzig.  
1889— Math.S.  
**Hamb. Nt. Vr. Ab.** ..... { Abhandlungen aus dem Gebiete der Naturwissenschaften, herausg.  
vom Naturwissensch. Verein von Hamburg-Altona. Hamburg.  
1846— Camb.U.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; N.H.M.;  
R.S.; S.K.  
**Hamb. Nt. Vr. Vh.** ..... { Verhandlungen des Naturwissenschaftlichen Vereins von Hamburg-  
Altona. Hamburg.  
1877—81; 1894— Dub.R.I.A.i.; Linn.S.i.; N.H.M.; R.S.  
**Hamb. Ws. Anst. Jb.** ..... { Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten.  
Hamburg.  
1884— Camb.U.; Edinb.R.S.; Linn.S.; N.H.M.; S.K.  
**Hann. Archt.-Vr. Z.** ..... { Zeitschr. des Architekten- und Ingenieur-Vereins zu Hannover.  
Hannover.  
1855— Camb.U.i.; I.CE.; P.O.  
**See Hann. Z. Archt.-Vr.**  
**Hann. Jbr.** ..... { Jahresbericht der Naturhistorischen Gesellschaft zu Hannover.  
Hannover.  
1851— Dub.R.I.A.; N.H.M.i.  
**Hann. Z. Archt.-Vr.** ..... **See Hann. Archt.-Vr. Z.**  
**Haarl. Arch. Ms. Teyl.** ... **See Haarl. Ms. Teyl. Arch.**  
**Heidl. Nt. Md. Vh.** ..... { Verhandlungen des Naturhistorisch-Medicinischen Vereins zu Heidel-  
berg. Heidelberg.  
**Heidl. Vh. Nt. Md.** ..... { 1857— Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Geol.S.; Linn.S.i.;  
N.H.M.i.; R.S.i.  
**Helsingf. Acta** ..... { Acta Societatis Scientiarum Fennicæ. Helsingfors.  
1842— B.M.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.;  
Glasg.U.i.; N.H.M.; Oxon.B.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.  
**Helsingf. Öfv.** ..... { Öfversigt af Finska Vetenskaps-Societetens Förhandlingar. Hel-  
singfors.  
1853— B.M.; Camb.P.S.i.; Camb.U.i.; Dub.R.D.S.; Dub.R.I.A.;  
Edinb.R.S.i.; Glasg.U.i.; N.H.M.; Oxon.B.; R.A.S.; R.Geogr.  
S.i.; R.S.  
**Hermbstädt BIL** ..... { Bulletin des Neuesten und Wissenswürdigsten aus der Naturwissen-  
schaft, etc.; Hermbstädt. Berlin.  
1809—13. B.M.; Camb.U.; R.S.  
**Hermbstädt Ms.** ..... { Museum des Neuesten und Wissenswürdigsten aus dem Gebiete der  
Naturwissenschaft, der Künste, der Fabriken, der Manufakturen,  
der technischen Gewerbe, der Landwirthschaft, der Produkten-  
waaren und Handelskunde, und der bürgerlichen Haushaltung,  
etc.; Hermbstädt. Berlin.  
1814—18. B.M.; Camb.U.; R.S.  
**Hermstdt. Vh.** ..... { Verhandlungen und Mittheilungen des Siebenbürgischen Vereins  
für Naturwissenschaften. Hermannstadt.  
1850— B.M.; Camb.U.; Dub.R.I.A.i.; N.H.M.; R.S.; S.K.  
**Hertha** ..... { Hertha, Zeitschrift für Erd-, Völker-, und Staaten-Kunde; Berghaus  
und Hoffmann. Stuttgart und Tübingen.  
1825—29. B.M.; Camb.U.; Oxon.B.; R.Geogr.S.; R.S.; S.K.;  
U.C.L.i.  
**Higl. S. T.** ..... { Prize Essays and Transactions of the Highland Society of Scotland.  
1799—1843. *Continued as:* Transactions of the Highland and  
Agricultural Society of Scotland. Edinburgh. 1843— B.M.;

## List of Serial Publications

- Camb.U.; Dub.R.D.S.; Edinb.R.S.; Geol.M.i.; Glasg.P.S.;  
Glasg.U.i.; Oxon.B.; P.O.; S.K.
- Hoeven en Vriese Ts. . .** Tijdschrift voor Natuurlijke Geschiedenis en Physiologie; Hoeven en Vriese. Amsterdam.  
1834—45. B.M.; Camb.U.; N.H.M.
- I. Ag. S. J. . . . .** Journal of the Agricultural and Horticultural Society of India. Calcutta.  
1842—93. *Continued as:* Proceedings and Journal, etc. 1894—  
B.M.i.; Linn.S.i.; N.H.M.; P.O.i.; R.S.i.  
*See I. J. Ag. S. and J. Ag. S. I.*
- I. CE. F. . . . .** Minutes of Proceedings of the Institution of Civil Engineers, containing Abstracts of the Papers and of the Discussions. London.  
1837— B.M.; Camb.P.S.; Camb.U.; Dub.R.C.S.; Dub.R.D.S.;  
Dub.R.I.A.; Edinb.R.S.; Edinb.U.; Geol.S.i.; Glasg.P.S.i.;  
Glasg.U.; I.CE.; Oxon.B.; Oxon.R.i.; P.O.; R.Geogr.S.; R.S.;  
S.K.; U.C.L.  
*See CE. I. F.*
- I. CE. T. . . . .** Transactions of the Institution of Civil Engineers. London.  
1836—42. B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.;  
Dub.R.D.S.; Edinb.R.S.; Geol.S.; Glasg.U.; I.CE.; Oxon.B.;  
Oxon.R.; P.O.; R.Geogr.S.; R.S.; U.C.L.i.  
*See CE. I. T.*
- I. Égypt. Bil. . . . .** Bulletin de l'Institut Egyptien. Caire.  
1859— Camb.P.S.i.; Camb.U.i.; N.H.M.; R.Geogr.S.i.; U.C.L.i.
- Iékat. S. Our. Bil. . . . .** Bulletin de la Société Ouralienne d'Amateurs des Sciences Naturelles.  
Ekaterinburg.  
1874— Edinb.R.S.i.; Geol.S.i.; N.H.M.i.
- I. Elect. E. J. . . . .** Journal of the Institution of Electrical Engineers, late the Society  
of Telegraph Engineers and Electricians. London.  
1890— B.M.; Camb.P.S.i.; Camb.U.; Dub.T.C.i.; Edinb.R.S.i.;  
Glasg.U.i.; I.CE.; Oxon.B.; Oxon.R.; P.O.; R.S.; S.K.; U.C.L.  
*See Tel. E. J.*
- I. Gl. Sv. Rc. . . . .** Records of the Geological Survey of India. Calcutta.  
1870—97. Camb.P.S.; Camb.U.i.; Dub.N.L.I.; Dub.R.C.S.;  
Dub.R.I.A.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.;  
I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; R.Geogr.S.; R.S.
- I. J. Ag. S. . . . .** *See I. Ag. S. J. and J. Ag. S. I.*
- Il Cim. . . . .** Il Cimento, rivista di Scienze, Lettere, ed Arti. Torino.  
1852—55. B.M.
- Il Polit. . . . .** Il Politecnico; repertorio mensile di studj applicati alla prosperità  
e coltura sociale.  
Il Politecnico; repertorio di studj letterarj, scientifici e tecnici. Milano.  
1839—44; 1860— B.M.; I.CE.i.; P.O.
- Il Progresso . . . . .** Il Progresso delle Scienze, Lettere, ed Arti. Napoli.  
First series undated; Second series 1832— Camb.U.; Oxon.B.
- I. ME. P. . . . .** Institution of Mechanical Engineers. Proceedings. Birmingham,  
London.  
1847— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.D.S.; Glasg.P.S.;  
Glasg.U.; I.CE.; P.O.; R.S.; S.K.i.; U.C.L.  
*See ME. I. P.*
- I. Mn. E. T. . . . .** Transactions of the Institution of Mining Engineers. Newcastle-  
upon-Tyne.  
1898— *Continuation of:* Transactions of the Federated Institution  
of Mining Engineers, 1889—98. Camb.U.; Edinb.R.S.; Geol.M.;  
Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.i.; Oxon.B.; P.O.; S.K.
- I. Mn. Mtl. T. . . . .** Transactions of the Institution of Mining and Metallurgy, London.  
London.  
1892— B.M.; Camb.U.i.; Geol.S.; Glasg.U.i.; I.CE.; N.H.M.;  
P.O.; S.K.
- Ing. . . . .** Der Ingenieur; Zeitschrift für das gesammte Ingenieurwesen;  
Bornemann. Freiberg.  
1848—50. B.M.; I.CE.; P.O.
- Innsb. Ferd. Z. . . . .** Zeitschrift des Ferdinandeums für Tirol und Vorarlberg. Innsbruck.  
1852— B.M.; N.H.M.; R.S.
- Innsb. Nt. Md. B. . . . .** Berichte des Naturwissenschaftlich-Medizinischen Vereins in Inns-  
bruck. Innsbruck.  
1870— B.M.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Linn.S.i.;  
N.H.M.; Oxon.R.; R.S.

## List of Serial Publications

- Iowa Ac. Sc. P.** ..... Proceedings of the Iowa Academy of Sciences. Des Moines.  
1875— B.M.i.; Edinb.R.S.i.; N.H.M.; Oxon.B.i.; P.O.; R.S.i.; U.C.L.i.
- Ir. Ac. Cunningham Mm.** Royal Irish Academy. "Cunningham Memoirs." Dublin.  
1880— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.; Edinb.U.; Glasg.P.S.; Glasg.U.i.; I.CE.i.; Linn.S.; Math.S.i.; N.H.M.i.; Oxon.B.; Oxon.R.; R.A.S.; R.Geogr.S.i.; R.S.i.; U.C.L.
- Ir. Ac. P.** ..... Proceedings of the Royal Irish Academy. (Science.) Dublin.  
1841— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- Ir. Ac. T.** ..... Transactions of the Royal Irish Academy. Science. Dublin.  
1787— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Edinb.U.; Geol.S.i.; Glasg.P.S.; Glasg.U.i.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.i.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.
- Ir. I. CE. T.** ..... The Transactions of the Institute of Civil Engineers of Ireland. Dublin.  
1845— Camb.U.i.; Dub.R.I.A.; Dub.T.C.; Glasg.U.i.; I.CE.; P.O.
- Ir. Ntlist.** ..... The Irish Naturalist: A Monthly Journal of General Irish Natural History. Dublin, Belfast, London.  
1892— B.M.; Camb.P.S.i.; Camb.U.; Dub.N.L.I.; Dub.R.C.S.; Dub.T.C.; Geol.M.i.; Geol.S.; Linn.S.; N.H.M.; S.K.
- Isère S. Bll.** ..... Bulletin de la Société de Statistique, des Sciences Naturelles, et des Arts Industriels du département de l'Isère. Grenoble.  
1838— B.M.i.; N.H.M.; Oxon.B.; R.S.i.
- I. & S. I. J.** ..... The Journal of the Iron and Steel Institute. London.  
1872— Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Oxon.B.; P.O.; R.S.; S.K.; U.C.L.
- It. S. Met. An.** ..... Annuario Meteorologico Italiano pubblicato per cura del Comitato direttivo della Società Meteorologica Italiana. Torino, Roma, Firenze.  
1886— B.M.
- J. Ag. S.** ..... Journal of the Royal Agricultural Society of England. London.  
1840— B.M.; Camb.U.; Chem.S.; Dub.T.C.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- J. Ag. S. I.** ..... See **Ag. S. J.**  
Journal of the Agricultural and Horticultural Society of India. Calcutta.  
1842—93. *Continued as:* Proceedings and Journal, etc., 1894— B.M.i.; Linn.S.i.; N.H.M.; P.O.i.; R.S.i.
- Jam. I. J.** ..... See **I. Ag. S. J.** and **I. J. Ag. S.**  
Journal of the Institute of Jamaica. Kingston, Jamaica.  
1891— B.M.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; N.H.M.; R.Geogr.S.i.; R.S.; S.K.
- J. Anal. C.** ..... The Journal of Analytical and Applied Chemistry. Easton, Pa.  
1887—93. Chem.S.; P.O.i.
- Jap. As. S. T.** ..... Transactions of the Asiatic Society of Japan. Yokohama.  
1872— B.M.; Camb.U.; Edinb.R.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.Geogr.S.i.; R.S.
- Jap. Seism. S. T.** ..... Transactions of the Seismological Society of Japan. Yokohama.  
1880—92. *Continued as:* Seismological Journal of Japan, 1893—95. Camb.U.; Dub.R.I.A.; Edinb.R.S.; Geol.M.; Glasg.U.i.; I.CE.i.; N.H.M.i.; R.A.S.i.; R.Geogr.S.; R.S.i.; U.C.L.i.
- Jb. Berg- Hm.** ..... Berg- und Hüttenmännisches Jahrbuch der k.k. Schemnitzer-Bergakademie und der k.k. Montan-Lehranstalten zu Leoben und Pibram. Wien.  
1851— B.M.i.; Geol.S.i.; I.CE.i.; P.O.i.; S.K.  
See **Berg- Hm. Jb.**, **Leoben Berg- Hm. Jb.**, and **Wien Berg- Hm. Jb.**

## List of Serial Publications

- Jb. Berg- Hw.** ..... Jahrbuch für das Berg- und Hüttenwesen im Königreiche Sachsen. Freiberg.  
1873— B.M.; Geol.S.; I.CE.; N.H.M.i.; P.O.; S.K.
- J. de Ps.** ..... Journal de Physique, de Chimie, et de l'Histoire Naturelle; de Lamétherie etc. Paris.  
1794—1823. B.M.; Camb.U.; Geol.S.; Glasg.U.i.; N.H.M.i.; Oxon.B.; Oxon.R.; R.S.; S.K.; U.C.L.i.
- J. de Ps.** ..... Journal de Physique Théorique et Appliquée; D'Almeida. Paris.  
1872— Camb.U.; Dub.R.C.S.; Glasg.U.i.; I.CE.i.; Oxon.R.; P.O.; R.S.; S.K.
- Jena. Z.** ..... Jenaische Zeitschrift für Naturwissenschaft, herausg. von der Medicinisch-Naturwissenschaftlichen Gesellschaft zu Jena. Jena.  
1864— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.D.S.i.; Edinb.R.S.; Edinb.U.i.; Glasg.U.i.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; R.S.; S.K.; U.C.L.
- Jern-Kont. A.** ..... Jern-Kontoret's Annaler. En Tidskrift för Svenska Bergshand- teringen. Stockholm.  
1817— I.CE.i.; P.O.; R.S.i.; S.K.
- J. f. O.** ..... Journal für Ornithologie. In Verbindung mit der Deutschen Ornithologischen Gesellschaft zu Berlin. Cassel, Leipzig.  
1853— B.M.; Glasg.U.i.; N.H.M.; R.S.
- J. Gén. Civ.** ..... Journal du Génie Civil des Sciences et des Arts. Paris.  
1828—48. B.M.i.; Camb.U.; P.O.
- J. H. Un. Cir.** ..... The Johns Hopkins University Circulars. Baltimore.  
1879— Camb.P.S.; Camb.U.; Dub.N.L.I.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Edinb.U.; Glasg.U.i.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- J. Lndw.** ..... Journal für Landwirthschaft. Celle, Göttingen, Berlin.  
1853— B.M.i.; P.O.i.
- J. Micr. Sc.** ..... Quarterly Journal of Microscopical Science; Lankester and Busk. London.  
1853— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.C.S.; Edinb.R.S.; Edinb.U.; Geol.S.i.; Glasg.P.S.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.i.; Oxon.R.; Pharm.S.; P.O.; R.S.; S.K.; U.C.L.
- J. Méd. Chir. Phm.** ..... Journal de Médecine, Chirurgie, Pharmacie, etc. Paris.  
1801—17. R.S.
- J. Mines** ..... Journal des Mines, ou Recueil de Mémoires sur l'exploitation des Mines, et sur les Sciences et les Arts qui s'y rapportent. Paris.  
1794—1815. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.; Geol.S.; I.CE.; Linn.S.i.; N.H.M.; Oxon.B.(R.); R.S.i.; S.K.
- J. Phm.** ..... Journal de Pharmacie et des Sciences accessoires. Paris.  
1815—41. *Continuation of:* Bulletin de Pharmacie, 1809—14. *Continued as:* Journal de Pharmacie et de Chimie, 1842— Camb.U.; Chem.S.; Edinb.R.S.i.; Glasg.U.; Oxon.B.; Pharm.S.; P.O.; R.S.i.; U.C.L.i.
- J. Fr. C.** ..... Journal für praktische Chemie; Erdman, etc. Leipzig.  
1834— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.; Dub.R.D.S.i.; Edinb.R.S.; Glasg.P.S.i.; Glasg.U.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.  
*See Erdm. J. Fr. C.*
- J. Sav.** ..... Journal des Savants. Paris.  
1816— B.M.; Camb.U.; Dub.N.L.I.i.; Dub.T.C.; Edinb.R.S.i.; Glasg.U.; Oxon.B.; Oxon.R.; P.O.i.; R.S.
- J. Sc.** ..... The Journal of Science and Annals of Astronomy, Biology, Geology, Industrial Arts, Manufactures and Technology. (Formerly the Quarterly Journal of Science.) London.  
1864—85. B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Edinb.R.S.; Glasg.U.i.; I.CE.; Linn.S.i.; N.H.M.; Oxon.R.; Pharm.S.i.; P.O.; R.A.S.i.; R.S.; S.K.
- J. Tél.** ..... Journal Télégraphique publié par le Bureau International des Administrations Télégraphiques. Berne.  
1869— P.O.
- Kan. Ac. Sc. T.** ..... Transactions of the Kansas Academy of Science. Topeka, Kansas;  
1872— Camb.P.S.i.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Linn.S.i.; N.H.M.; Oxon.B.i.; R.S.i.; U.C.L.i.



## List of Serial Publications

- Kan. Un. Q.** ..... The Kansas University Quarterly. Laurence, Kansas.  
1893— B.M.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.  
S.i.; Glasg.P.S.i.; Math.S.i.; N.H.M.i.; R.S.
- Karlsruhe Nt. Vr. Vh.** ... Verhandlungen des Naturwissenschaftlichen Vereins in Karlsruhe.  
Karlsruhe.  
1864— B.M.i.; Dub.R.I.A.; N.H.M.
- Kärnten Berg- Vr. Z.** ... { Zeitschrift des berg- und hüttenmännischen Vereines für Kärnten.  
Klagenfurt.  
**Kärnten Z.** ..... { 1869—81. P.O.; S.K.i.
- Karsten Arch.** ..... Archiv für Mineralogie, Geognosie, Bergbau, und Hüttenkunde;  
Karsten. Berlin.  
1829—55. B.M.; Edinb.R.S.i.; Geol.M.; Geol.S.; N.H.M.; P.O.; R.S.
- Karsten Arch. Bergbau.** ... Archiv für Bergbau und Hüttenwesen; Karsten. Berlin, Breslau.  
1818—31. N.H.M.; P.O.; R.S.; S.K.
- Kastner Arch. C.** ..... Archiv für Chemie und Meteorologie; Kastner. Nürnberg.  
1830—35. Edinb.R.S.; N.H.M.; P.O.; R.S.
- Kastner Arch. Ntl.** ..... Archiv für die gesammte Naturlehre; Kastner. Nürnberg.  
1824—35. B.M.; N.H.M.; P.O.; S.K.
- Kazan As. Obs. Pb.** ..... Publications of the Astronomical Observatory of the Imperial  
University of Kazan. Kazan.  
1893— R.A.S.
- Kazan Mm. Un.** ..... Scientific Memoirs published by the Imperial University of Kazan.  
Kazan.  
1834— B.M.i.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.;  
Glasg.P.S.i.; Linn.S.i.; R.S.i.  
See **Kazan Un. Mm.**
- Kazan S. Nt. (Ps.-Mth.) P.** Proceedings of the Physico-Mathematical Section of the Naturalists'  
Society of the Imperial University of Kazan. Kazan.  
1883—90. Continued as: Bulletin de la Société Physico-Mathé-  
matique de Kasan, 1891— R.S.
- Kazan S. Ps.-Mth. Bil.** ... Bulletin de la Société Physico-Mathématique de Kasan. Kasan.  
1891— Continuation of: Proceedings of the Physico-Mathematical  
Section of the Naturalists' Society of the Imperial University of  
Kazan, 1883—90. Dub.R.I.A.i.; Edinb.R.S.i.; R.S.i.
- Kazan Un. Mm.** ..... See **Kazan Mm. Un.**
- Kharkov Mth. S. Com.** ... Communications and Proceedings of the Mathematical Society of  
the Imperial University of Kharkov. Kharkov.  
1879?— R.S.i.
- Kiel Schr.** ..... Schriften der Universität zu Kiel. Kiel.  
1855—80. B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.i.;  
Oxon.B.; R.Geogr.S.; R.S.; S.K.i.
- Kjöb. Dn. Vd. Selsk. Afh.** { Det Kongelige Danske Videnskabernes Selskabs naturvidenskabelige  
og mathematisk Afhandlinger. Kiöbenhavn.  
**Kjöb. Dn. Vd. Selsk. Afh.** { 1824—46. B.M.; Dub.T.C.; Edinb.R.S.; Geol.S.i.; Linn.S.i.;  
N.H.M.; R.S.; S.K.
- Kjöb. Dn. Vd. Selsk. Skr.** { Det Kongelige Danske Videnskabernes Selskab Skriver. Kiöbenhavn.  
**Kjöb. Dn. Vd. Selsk. Skr.** { 1801—18. B.M.; Camb.P.S.i.; Camb.U.; Edinb.R.S.; N.H.M.;  
Oxon.B.; R.S.
- See **Dn. Vd. Selsk. Skr.**
- Kjöb. Dn. Vd. Selsk. Skr.** { Det Kongelige Danske Videnskabernes Selskabs Skrifter. Natur-  
videnskabelig og Mathematisk Afdeling. Kjöbenhavn.  
**Kjöb. Skr.** ..... { 1849— B.M.; Camb.U.i.; Edinb.R.S.; Linn.S.; N.H.M.; R.A.S.;  
R.Geogr.S.i.; R.S.; U.C.L.i.
- Kjöb. Ov.** ..... { Oversigt over det Kongelige Danske Videnskabernes Selskabs For-  
handlinger. Kjöbenhavn.  
**Kjöb. Ov.** ..... { 1806— Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.D.S.i.; Dub.  
R.I.A.i.; Dub.T.C.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; Linn.  
S.i.; N.H.M.i.; Oxon.R.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.;  
S.K.i.; U.C.L.i.
- Kolozsvár Orv.-Term.** { Értetítő a "Kolozsvári Orvos-Természettudományi Társulat" -nak  
Társ. Éts. .... { az...orvosi, természettudományi szaküléseiről... [Proceedings  
of the medical and natural history sections of the Klausenburg  
Medical and Natural History Society.] Kolozsvartt [Klausenburg].  
1876—79. N.H.M.
- Königsb. Schr.** ..... Schriften der königlichen Physikalisch-Oekonomischen Gesellschaft  
zu Königsberg. Königsberg.  
1860— B.M.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.i.; Linn.S.;  
N.H.M.; P.O.i.; R.Geogr.S.i.; R.S.; S.K.



## List of Serial Publications

- Kosmos (Lw.)** ..... Kosmos. Czasopismo polskiego Towarzystwa przyrodników imienia Kopernika. [Cosmos. The Journal of the Polish Society of Naturalists founded in honour of Copernicus.] Lwow.  
1876— B.M.; N.H.M.
- Krk. Ak. (Mt.-Prz.) Pam.** ..... Pamiętnik Akademii Umiejętności w Krakowie. Wydział Matematyczno-Przyrodniczy. [Memoirs of the Academy of Science in Cracow. Section of Mathematics and Natural Science.] Kraków.  
1874— B.M.; Edinb.R.S.i.; Glasg.U.i.; N.H.M.
- Krk. Ak. (Mt.-Prz.) Rz.** ..... { Rozprawy... Wydziału Matematyczno-Przyrodniczego Akademii  
**Krk. Ak. (Mt.-Prz.) Rz. & Sp.** ..... { Umiejętności. [Proceedings of the Section of Mathematics and Natural Science of the Academy of Science.] Kraków.  
1874— B.M.; Camb.U.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; N.H.M.
- Krk. Roczn. Tow. Nauk.** ..... { Rocznik Towarzystwa Naukowego z Uniwersytetem Krakowskim  
**Krk. Roczn. Uniwers. ...** ..... { Połączonego. Krakowie. [Annals of the Scientific Society of the Polish University of Krakow. Krakow.]  
1817—72. B.M.; Glasg.U.i.
- Lamont Jb. Sternw. Münch.** ..... Jahrbuch der K. Sternwarte bei München; Lamont. München.  
1838— B.M.; Camb.U.; R.A.S.i.; R.S.
- Lanc. Hist. S. T.** ..... { Proceedings and Papers of the Lancashire and Cheshire Historic  
**Lanc. T. Hist. S.** ..... { Society. Liverpool.  
1849—54. Continued as: Transactions, etc., 1855— B.M.; Camb.U.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; Oxon.B.i.; R.Geogr.S.i.; R.S.
- Laus. Bil. S. Vd.** ..... Bulletin des Séances de la Société Vaudoise des Sciences Naturelles. Lausanne.  
1842— Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Geol.S.; Linn.S.; N.H.M.; Oxon.B.i.; R.S.; S.K.i.
- See Laus. S. Vd. Bil.**
- Lausitz. Mschr.** ..... Lausitzische [und neue Lausitzische] Monatschrift. Organ der Oberlausitzischen Gesellschaft der Wissenschaften. Görlitz.  
1800—08. B.M.
- Laus. S. Vd. Bil.** ..... **See Laus. Bil. S. Vd.**
- Lb.** ..... The Laboratory, a Weekly Record of Scientific Research. London.  
1867. B.M.; Chem.S.; Oxon.R.; Pharm.S.; P.O.; R.S.
- Leic. S. T.** ..... The Transactions of the Leicester Literary and Philosophical Society. Leicester.  
1835— Camb.U.; Dub.R.D.S.; Geol.S.; Glasg.P.S.; Linn.S.i.; N.H.M.i.; Oxon.B.; P.O.; S.K.; U.C.L.
- Leijd. A. Ac.** ..... Annales Academiæ Lugduno-Batavæ. Leijden.  
1815—75. B.M.; Camb.U.; Dub.T.C.i.; N.H.M.; Oxon.B.; R.S.i.; U.C.L.i.
- Leip. Ab. Mth. Ps.** ..... Abhandlungen der Mathematisch-Physischen Classe der Königlich Sächsischen Gesellschaft der Wissenschaften. Leipzig.  
1852— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Glasg.U.; Math.S.i.; N.H.M.; Oxon.B.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.i.
- See Leip. Mth. Ps. Ab.**
- Leip. As. Gs. Vjschr.** ..... Vierteljahrsschrift der Astronomischen Gesellschaft. Leipzig.  
1866— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Oxon.R.; R.A.S.; R.S.; S.K.
- Leip. B.** ..... Berichte über die Verhandlungen (Math.-Phys. Classe) der Königlich Sächsischen Gesellschaft der Wissenschaften zu Leipzig. Leipzig.  
1846— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Glasg.U.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.; R.S.; S.K.i.; U.C.L.i.
- See Leip. Mth. Ps. B.**
- Leip. Jablon. Preisschr.** ..... Preisschriften gekrönt und herausgegeben von der Fürstlich Jablonowski'schen Gesellschaft zu Leipzig. Leipzig.  
1847— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; Oxon.B.; R.A.S.i.; R.S.i.; U.C.L.i.
- Leip. Mth. Ps. Ab.** ..... **See Leip. Ab. Mth. Ps.**
- Leip. Mth. Ps. B.** ..... **See Leip. B.**
- Leip. Nf. Gs. Sb.** ..... Sitzungsberichte der Naturforschenden Gesellschaft zu Leipzig. Leipzig.  
1875— B.M.; Camb.U.; Edinb.R.S.i.; N.H.M.; R.S.i.; S.K.

## List of Serial Publications

- Le Mans S. R. Tr.** ..... { Analyse des Travaux de la Société [Royale] des Arts du Mans.  
**Le Mans Tr. S.** ..... { Le Mans.  
 1820. N.H.M.; R.S.
- Leoben Berg- Hm. Jb.** ... Berg- und Hüttenmännisches Jahrbuch der k.k. Schemnitzer-  
 Bergakademie und der k. k. Montan-Lehranstalten zu Leoben  
 und Pibram. Wien.  
 1851— B.M.i.; Geol.S.i.; I.CE.i.; P.O.i.; S.K.
- Leonhard u. Bronn N. Jb.** See **Berg- Hm. Jb.**, **Jb. Berg- Hm.**, and **Wien Berg- Hm. Jb.**  
 Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petre-  
 faktenkunde; Leonhard und Bronn. Stuttgart.  
 1833—62. *Continuation of:* Jahrbuch für Mineralogie, etc., 1830—  
 32. *Continued as:* Neues Jahrbuch für Mineralogie, Geologie  
 und Paläontologie, 1863— B.M.; Camb.U.; Dub.N.L.I.i.;  
 Dub.R.D.S.i.; Geol.M.; Geol.S.; Glasg.U.; N.H.M.; Oxon.R.;  
 R.S.; S.K.i.
- Le Puy A. S. Ag.** ..... { Annales de la Société d'Agriculture, Sciences, etc. du Puy. Le Puy.  
**Le Puy S. Ag. A.** ..... { 1826— Geol.S.i.; N.H.M.
- Les Mondes** ..... Les Mondes, Revue hebdomadaire des Sciences et de leurs  
 Applications aux Arts, et à l'Industrie; l'Abbé F. Moigno.  
 Paris.  
 1863—84 B.M.; Camb.U.i.; Dub.N.L.I.i.; Glasg.P.S.i.; I.CE.i.;  
 Oxon.R.; P.O.; R.S.i.; S.K.i.
- L'I** ..... L'Institut; Journal des Académies et Sociétés Scientifiques de la  
 France et de l'Étranger. Paris.  
 1833— B.M.i.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Geol.S.i.;  
 Glasg.P.S.i.; N.H.M.; Oxon.B.(R.); P.O.i.; R.S.i.; S.K.i.
- Lieb. A.** ..... Annalen der Chemie und Pharmacie; Liebig etc. Lemgo, Leipzig,  
 Heidelberg.  
 1832— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.;  
 Edinb.R.S.i.; Glasg.P.S.; Glasg.U.i.; N.H.M.; Oxon.R.;  
 Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.
- See **A. C. Phm.**
- Liège Mm. S. Sc.** ..... Mémoires de la Société [Royale] des Sciences, de l'Agriculture, et  
 des Arts à Liège. Liège.  
 1843— B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Geol.S.;  
 Glasg.P.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.; Oxon.B.; P.O.;  
 R.S.; S.K.
- See **Liège S. Sc. Mm.**
- Liège S. Gl. Blg. A.** ..... Annales de la Société Géologique de Belgique. Liège.  
 1874— Camb.P.S.; Geol.M.; Geol.S.; N.H.M.; R.S.; S.K.i.
- See **Liège Mm. S. Sc.**
- Lille Mm.** ..... { Mémoires de la Société [Royale] des Sciences, etc. à Lille. Lille.  
**Lille Mm. S.** ..... { 1827—96. B.M.; Camb.U.; Dub.T.C.; N.H.M.; Oxon.B.; Oxon.R.;  
**Lille S. Mm.** ..... { R.S.i.
- Lille Tr.** ..... Recueil des Travaux de la Société d'Amateurs des Sciences, de  
 l'Agriculture, et des Arts à Lille. Lille.  
 1819—27. B.M.; Camb.U.; Dub.T.C.; N.H.M.; Oxon.B.; Oxon.R.;  
 R.S.
- Lindenau Z.** ..... Zeitschrift für Astronomie und verwandte Wissenschaften; Lindenau.  
 Tübingen.  
 1816—18. B.M.; Camb.U.; R.A.S.; R.S.
- Liouv. J.** ..... { Journal de Mathématiques pures et appliquées, fondé par Joseph  
**Liouv. J. Mth.** ..... { Liouville. Paris.  
 1836— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Edinb.U.;  
 Glasg.P.S.i.; Glasg.U.; I.CE.i.; Oxon.B.(R.); R.S.; S.K.; U.C.L.
- Lisb. A.** ..... Annaes das Sciencias e Lettras, publicados debaixo dos auspicios da  
 Academia Real das Sciencias: Sciencias mathematicas, physicas,  
 historico-naturaes e medicas. Lisboa.  
 1857— B.M.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; R.A.S.i.; R.S.i.;  
 S.K.i.
- See **A. Sc.**
- Lisb. Ac. Sc. Mm.** ..... Historia e Memorias da Academia Real das Sciencias de Lisboa.  
 Lisboa.  
 1797— B.M.; Camb.U.; Edinb.R.S.; Geol.S.i.; N.H.M.; Oxon.B.;  
 R.A.S.; R.Geogr.S.i.; R.S.i.; S.K.i.
- See **Lisb. Mm.**, **Lisb. Mm. Ac. Sc.** and **Lisb. Mm. Sc.**
- Lisb. A. Mar.** ..... Annaes maritimos e coloniaes. Lisboa.  
 1840—45. N.H.M.; Oxon.B.i.; R.Geogr.S.i.

## List of Serial Publications

- Lisb. J. Sc. Mth.**..... Jornal de Sciencias mathematicas, physicas e naturaes. Publicado sob os auspicios da Academia R. das Sciencias de Lisboa. Lisboa.  
1868— B.M.; Camb.U.; Dub.R.D.S.i.; Edinb.R.S.i.; Geol.S.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; R.A.S.; R.Geogr.S.; R.S.; U.C.L.i.
- Lisb. Mm.**  
**Lisb. Mm. Ac. Sc.** } ..... See **Lisb. Ac. Sc. Mm.**  
**Lisb. Mm. Sc.**  
**L. Md. Ps. J.**..... The Medical and Physical Journal. London.  
1799—1833. B.M.; Camb.U.i.; Chem.S.i.; Oxon.B.; Pharm.S.i.  
Proceedings of the London Mathematical Society. London.  
1865— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Glasg.U.; Math.S.; Oxon.B.i.; Oxon.R.; R.S.; S.K.; U.C.L.
- L. Mth. S. P.**..... Landwirthschaftliches Centralblatt für Deutschland. Berlin.  
1853—76. B.M.
- Lndw. Cb.**..... Die landwirthschaftlichen Versuchs-Stationen. Organ für wissenschaftliche Forschungen auf dem Gebiete der Landwirthschaft. Dresden, Chemnitz.  
1859— B.M.i.; Camb.U.; Chem.S.i.; Glasg.U.i.; Oxon.B.; P.O.i.; R.S.i.
- Lotos**..... Lotos. Zeitschrift für Naturwissenschaften. Prag.  
1851—95. B.M.; Camb.U.; Dub.R.I.A.i.; N.H.M.
- Louvain A. Ac.**..... Annales Academiæ Lovaniensis. Bruxelles, Louvain.  
1821—27. B.M.; Camb.U.; Dub.T.C.; Oxon.B.; R.S.
- Lpldina**..... Leopoldina: amtliches Organ der Kaiserlichen Leopoldino-Carolinischen Deutschen Akademie der Naturforscher. Dresden.  
1859— B.M.; Camb.P.S.; Camb.U.i.; Edinb.R.S.i.; Linn.S.; N.H.M.; R.A.S.i.; R.S.
- L. Pol. Mg.**..... Polytechnic Magazine and Journal of Science, Literature and the Fine Arts. London.  
1844. *Continued as:* The London Polytechnic Review and Magazine, 1845. B.M.; Camb.U.
- Lpool Lt. Ph. S. P.**..... Proceedings of the Literary and Philosophical Society of Liverpool. London, Liverpool.  
1844— B.M.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.; Glasg.P.S.; I.CE.i.; Linn.S.; N.H.M.; Oxon.B.i.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- L. P. Sc. S.**..... Proceedings of the Scientific Society of London. London.  
1839—40. Geol.S.; I.CE.i.
- L. Ps. S. P.**..... Proceedings of the Physical Society of London. London.  
1874— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Math.S.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.i.
- Lucca At. Ac.**..... Atti della R. Accademia Lucchese di Scienze, Lettere, ed Arti. Lucca.  
1821— B.M.; Camb.U.; Dub.T.C.i.; Oxon.B.i.
- Lum. Élect.**..... La Lumière Electrique. Journal universel d'Electricité. Paris.  
1879—94. B.M.; Glasg.U.i.; I.CE.; P.O.; S.K.i.
- Lund. Acta Un.**..... Acta Universitatis Lundensis. Lunds Universitets Års-skrift. Afdelningen för Matematik och Naturvetenskap. Lund.  
1864— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.; Oxon.B.; R.S.; S.K.i.  
See **Lund. Un. Acta.**
- Lund Phys. Sällsk. Årsb.**..... Physiographiska Sällskapets Årsberättelse. Lund.  
1823—24. R.S.i.
- Lund Phys. Sällsk. Ts...**..... Physiografiska Sällskapets Tidskrift. Lund.  
1837—38 Camb.U.; N.H.M.; R.S.
- Lund. Un. Acta**..... See **Lund. Acta Un.**
- Lüneb. Nt. Vr. Jh.**..... Jahreshefte des Naturwissenschaftlichen Vereins für das Fürstentum Lüneburg. Lüneburg.  
1865— N.H.M.
- Lux. I. Pb.**..... Publications de l'Institut Royal Grand-Ducal de Luxembourg. Section des Sciences Naturelles et Mathématiques: ci-devant "Société des Sciences Naturelles." Luxembourg.  
1870— Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; R.S.i.

## List of Serial Publications

- Lux. S. Sc. Mm.** ..... { Société des Sciences Naturelles du Grand-Duché de Luxembourg.  
Luxembourg.  
**Lux. S. Sc. Nt.** ..... { 1853—69. Dub.R.I.A.; R.S.  
**Lyon Ac. Mm. (Sc.)** ..... { Mémoires de l'Académie des Sciences, Belles-Lettres et Arts de  
Lyon. Classe des Sciences. Lyon, Paris.  
**Lyon Ac. Sc. Mm.** ..... { 1845— B.M.; Camb.U.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; Oxon.B.;  
R.S.i.; S.K.i.  
See **Lyon Mm. Ac. and Lyon Mm. Ac. Sc.**  
**Lyon A. S. Ag.** ..... { Annales des Sciences physiques et naturelles, d'Agriculture, et  
d'Industrie, publiées par la Société d'Agriculture, etc.  
Annales de la Société d'Agriculture, Histoire Naturelle et Arts  
Utiles de Lyon. Lyon.  
1838— B.M.; Camb.U.; Dub.R.I.A.; Linn.S.; N.H.M.; Oxon.B.;  
P.O.; R.S.; S.K.i.  
See **Lyon S. A. Ag. and Lyon S. Ag. A.**  
**Lyon A. S. L.** ..... { Annales de la Société Linnéenne de Lyon. Lyon.  
1836— B.M.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.; Linn.S.i.;  
N.H.M.; Oxon.B.i.(R.); R.S.i.; S.K.i.  
See **Lyon S. L. A.**  
**Lyon Mm. Ac.** ..... { See **Lyon Ac. Mm. (Sc.) and Lyon Ac. Sc. Mm.**  
**Lyon Mm. Ac. Sc.** ..... {  
**Lyon S. A. Ag.** ..... { See **Lyon A. S. Ag.**  
**Lyon S. Ag. A.** ..... {  
**Lyon S. L. A.** ..... { See **Lyon A. S. L.**  
**Lyon Un. A.** ..... { Annales de l'Université de Lyon. Paris, Lyon.  
1891— B.M.; Edinb.R.S.; N.H.M.i.; R.S.i.  
  
**Mâcon Ac. A.** ..... { Annales de l'Académie de Mâcon, Société des Arts, Sciences, Belles-  
Lettres et d'Agriculture. Mâcon.  
1851— B.M.; R.S.i.  
**Mâcon S. Ag. C. R.** ..... { Compte Rendu des Travaux de la Société (d'Agriculture,) des  
Sciences, Arts et Belles-Lettres, de Mâcon. Mâcon.  
1807—52. B.M.i.; R.S.i.  
**Madras Eng. Rp.** ..... { Reports, etc. on various professional subjects connected with the  
duties of the Corps of Engineers of the Madras Presidency;  
Capt. J. T. Smith, F.R.S. Madras.  
1839—46. I.CE.; P.O.; R.S.  
**Madras J.** ..... { The Madras Journal of Literature and Science. Madras.  
1833— B.M.i.; Camb.U.; Dub.N.L.I.i.; Geol.S.i.; Linn.S.i.;  
N.H.M.; Oxon.B.i.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.i.;  
S.K.i.; U.C.L.i.  
**Madrid Ac. Ci. Mm.** ..... { Memorias de la Real Academia de Ciencias. Madrid.  
1850— B.M.; Camb.U.i.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.;  
Geol.S.; Linn.S.i.; N.H.M.; Oxon.B.; R.A.S.i.; R.Geogr.S.i.;  
R.S.i.; S.K.i.; U.C.L.i.  
See **Madrid Mm.**  
**Madrid A. H. Nt.** ..... { Anales de Historia Natural. Madrid.  
1799—1804. B.M.; N.H.M.; R.S.  
**Madrid A. Minas** ..... { Anales de Minas. Madrid.  
1838—46. Geol.S.; P.O.; S.K.i.  
**Madrid Bl.** ..... { Boletín Oficial del Ministerio de Comercio, etc. Madrid.  
1848—51. P.O.  
**Madrid Mm.** ..... { See **Madrid Ac. Ci. Mm.**  
**Madrid Rv.** ..... { Revista de los Progresos de las Ciencias exactas, físicas, y naturales.  
Madrid.  
1850—86. B.M.; Dub.R.D.S.i.; Edinb.R.S.i.; Geol.S.i.; N.H.M.;  
Oxon.R.i.; R.A.S.i.; R.S.i.  
**Mag. Ak. Éts. (Mth. Term.)** ..... { Magyar akadémiai Értesítő. A matematikai és természettudo-  
mányi osztályok közlönye. [Report of the Hungarian Academy.  
Communications of the Mathematical and Natural Science  
sections.] Pest.  
1860—65. B.M.; Camb.P.S.i.; Geol.S.i.; R.S.; S.K.i.  
**Magdeb. Nt. Vr. Jbr. u.** ..... { Jahresbericht und Abhandlungen des Naturwissenschaftlichen  
Ab. Vereins zu Magdeburg. Magdeburg.  
1869— B.M.; R.S.i.  
**Mag. Tud. Ak. Étk. (Mth.)** ..... { Értekezések a Matematikai Osztály köréből. Kiadja a Magyar  
Tudományos Akadémia. [Memoirs on Mathematical subjects.  
Published by the Hungarian Academy of Science.] Pest.  
1867—94. B.M.; Edinb.R.S.i.; Geol.S.i.; R.S.; S.K.i.



## List of Serial Publications

- Mag. Tud. Ak. Éts.** ..... A Magyar Tudományos Akadémia Ertesítője. [Report of the Hungarian Academy of Science.] Pest.  
1867— B.M.; R.Geogr.S.i.; S.K.i.
- Majocchi A. Fis. C.** ..... Annali di Fisica, Chimica, e Matematiche, col Bulletino dell' Industria meccanica e chimica; Majocchi. Milano.  
1841—50. B.M.; R.S.
- Manch. Gl. S. T.** ..... Transactions of the Manchester Geological Society. London.  
1841— B.M.; Camb.U.i.; Dub.T.C.; Edinb.R.S.i.; Geol.M.; Geol.S.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.S.; U.C.L.
- Manch. Lt. Ph. S. Mm.** ..... Memoirs of the Literary and Philosophical Society of Manchester. London and Manchester.  
1785—1887. *Continued as:* Memoirs and Proceedings, etc., 1888— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Geol.S.; Glasg.P.S.i.; Glasg.U.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.i.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.  
*See* **Manch. Mm. Ph. S.**, **Manch. Ph. S. Mm.** and **Manch. S. Mm.**
- Manch. Lt. Ph. S. Mm. & P.** ..... Memoirs and Proceedings of the Manchester Literary and Philosophical Society. Manchester.  
1888— *Continuation of:* Memoirs, etc., 1785—1887, and Proceedings, etc., 1857—87. B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; I.CE.; Linn.S.; Math.S.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Manch. Lt. Ph. S. P.** ..... Proceedings of the Literary and Philosophical Society of Manchester. Manchester.  
1857—87. *Continued as:* Memoirs and Proceedings, etc., 1888— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.P.S.; Glasg.U.i.; I.CE.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.  
*See* **Manch. Ph. S. P.** and **Manch. S. P.**
- Manch. Mcr. S. T.** ..... Manchester Microscopical Society. Transactions and Annual Report. Manchester.  
1884— *Continuation of:* Reports, 1880—84. B.M.i.; Camb.U.i.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; P.O.; S.K.i.
- Manch. Mm. Ph. S.** ..... } *See* **Manch. Lt. Ph. S. Mm.**
- Manch. Ph. S. Mm.** ..... }
- Manch. Ph. S. P.** ..... *See* **Manch. Lt. Ph. S. P.**
- Manch. S. Mm.** ..... *See* **Manch. Lt. Ph. S. Mm.**
- Manch. S. P.** ..... *See* **Manch. Lt. Ph. S. P.**
- Marb. Schr.** ..... Schriften der Gesellschaft zur Beförderung der gesammten Naturwissenschaften zu Marburg. Marburg.  
1823— B.M.i.; Camb.U.; N.H.M.; Oxon.R.; R.S.; S.K.i.
- Marseille Ac. Mm.** ..... { Mémoires publiés par l'Académie de Marseille. Marseille.  
**Marseille Mm. Ac.** ..... { 1803—14; 1848— B.M.; Camb.U.i.; R.S.i.; S.K.i.
- Mars. Fac. Sc. A.** ..... Annales de la Faculté des Sciences de Marseille. Marseille, Paris.  
1891— B.M.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.; Glasg.P.S.; Linn.S.; Math.S.i.; N.H.M.; R.A.S.; R.S.
- Maryland Gl. Sv.** ..... Maryland Geological Survey. Baltimore.  
1897— Camb.P.S.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.i.; N.H.M.; P.O.; R.Geogr.S.; R.S.; U.C.L.
- Mathematician** ..... The Mathematician; Davies, etc. London.  
1845—50. B.M.; Camb.U.; Dub.T.C.; Oxon.B.; R.S.
- Mathesis** ..... Mathesis. Recueil Mathématique... Gand, Paris.  
1881— B.M.; Camb.U.
- Maurice FV. S. H. Nt.** ... Procès-Verbaux de la Société d'Histoire Naturelle de l'Ile Maurice.  
**Maurice S. H. Nt. FV.** ... Maurice.  
1831; 1842—46. Linn.S.; N.H.M.; R.Geogr.S.; S.K.
- Mbl. Nt.** ..... Maanblad voor Natuurwetenschappen, uitgegeven door de Sectie voor Natuurwetenschappen van het Genootschap ter Bevordering van Natuur-, Genees- en Heelkunde. Amsterdam.  
1871— N.H.M.
- Mcr. S. J.** ..... Journal of the Royal Microscopical Society. London.  
1878— *Continuation of:* The Monthly Microscopical Journal, 1869—77. B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.P.S.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.S.i.; S.K.; U.C.L.



## List of Serial Publications

- Mcrc. S. T.** ..... Transactions of the Microscopical Society of London. London.  
1844—68. *Continued as:* The Monthly Microscopical Journal,  
1869—77. B.M.; Camb.U.i.; Edinb.R.S.i.; Geol.S.; Glasg.U.;  
Linn.S.; N.H.M.; Oxon.B.; Oxon.R.i.; Pharm.S.i.; P.O.; R.S.;  
S.K.; U.C.L.
- Meckl. Vr. Nt. Arch.** ... Archiv des Vereins der Freunde der Naturgeschichte in Mecklenburg.  
Neubrandenburg.  
1847— Camb.U.; Linn.S.i.; N.H.M.; R.S.i.
- Medley I. Eng.** ..... { Professional Papers on Indian Engineering; Major J. G. Medley.  
**Medley Prof. Pp. I. Eng.** { Boorkee.  
1864—86. I.CE.; P.O.i.; R.S.i.
- ME. I. P.** ..... Institution of Mechanical Engineers. Proceedings. Birmingham,  
London.  
1847— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.D.S.; Glasg.U.;  
I.CE.; P.O.; R.S.; S.K.i.; U.C.L.
- See **I. ME. P.**
- Meisner A.** ..... Annalen der allgemeinen Schweizerischen Gesellschaft für die  
gesammten Naturwissenschaften; Meisner. Bern.  
1824—25. B.M.; Linn.S.; N.H.M.; R.S.
- Mende S. Ag. Mm.** ..... Mémoires et Analyses de Travaux de la Société d'Agriculture, Com-  
merce, Sciences, et Arts de la ville de Mende, Département de la  
Lozère. Mende.  
1827—50. R.S.
- Mengelwerk Wisk. Vh.** Mengelwerk van uitgeleezene en andere Wis- en Natuurkundige Ver-  
handeligen; door het Genootschap der Mathematische Weten-  
schappen, etc. Amsterdam.  
1796—1816. R.S.
- See **Amst. Mengelwerk.**
- Mess. Mth.** ..... The Messenger of Mathematics. Cambridge, London.  
1862— B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.i.; Dub.R.C.S.i.;  
Dub.R.D.S.i.; Edinb.R.S.i.; Edinb.U.; Glasg.U.; Math.S.i.;  
Oxon.B.; Oxon.R.; R.S.; S.K.; U.C.L.
- Met. S. QJ.** ..... Quarterly Journal of the Royal Meteorological Society. London.  
1873— Camb.U.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Geol.S.;  
Glasg.U.; I.CE.; Linn.S.i.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.i.;  
R.S.
- Met. Z.** ..... Meteorologische Zeitschrift. Berlin.  
1884— Camb.U.; Edinb.R.S.; P.O.; R.Geogr.S.; R.S.; S.K.
- Metz Ac. Mm.** ..... { Mémoires de l'Académie (Royale, Impériale) de Metz. Metz.  
**Metz Mm. Ac.** { 1821— B.M.; Camb.U.; Dub.T.C.; N.H.M.; Oxon.B.; R.S.i.;  
S.K.
- Méx. Bl. Gg.** ..... Boletín del Instituto Nacional [afterwards de la Sociedad Mexicana]  
de Geografía y Estadística de la República Mexicana. México.  
1850—66. B.M.; Oxon.B.i.; R.Geogr.S.i.
- Méx. Gg. Bl.** ..... Boletín de la Sociedad de Geografía y Estadística de la República  
Mexicana. México.  
1869— B.M.; Edinb.R.S.i.; R.Geogr.S.i.
- Méx. S. "Alzate" Mm.** Memorias de la Sociedad Científica "Antonio Alzate." México.  
1887— B.M.i.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.; Glasg.U.i.;  
Linn.S.i.; Math.S.i.; N.H.M.i.; R.A.S.; R.Geogr.S.i.; R.S.;  
S.K.i.; U.C.L.i.
- Mg. Ntvd.** ..... Magazin für Naturvidenskaberne; Lundh, etc. Christiania.  
1823—36. B.M.; N.H.M.i.; R.S.
- Mh. Mth. Ps.** ..... Monatshefte für Mathematik und Physik. Wien.  
1890— B.M.; Camb.U.; Edinb.U.; Math.S.i.; N.H.M.
- Midl. Ntlist.** ..... The Midland Naturalist. London, Birmingham.  
1878—93. Camb.U.; Geol.M.; Geol.S.i.; Linn.S.; N.H.M.; P.O.;  
S.K.
- Mil. At. I. Lomb.** ..... Atti dell' I. R. Istituto Lombardo di Scienze, Lettere, ed Arti.  
Milano.  
1858—64. B.M.; Camb.U.; Edinb.R.S.; I.CE.i.; N.H.M.; Oxon.B.;  
R.Geogr.S.; R.S.
- Mil. At. S. It.** ..... Atti della Società Italiana di Scienze Naturali. Milano.  
1855— B.M.; Camb.U.; Edinb.R.S.i.; N.H.M.; P.O.i.; R.S.; S.K.i.
- See **Mil. S. It. At.**
- Mil. Effem.** ..... { Effemeridi Astronomiche di Milano. Con Appendice di Osservazioni  
**Mil. Effem. As.** { e Memorie Astronomiche. Milano.  
1806— Camb.U.; Oxon.B.; R.A.S.i.

## List of Serial Publications

- Mil. G. I. Lomb.** ..... Giornale dell' I. R. Istituto Lombardo di Scienze, Lettere, ed Arti, e Biblioteca Italiana; compilata da varj dotti nazionali e stranieri. Milano.  
1841—56. B.M.; Geol.S.i.; I.CE.; N.H.M.; Oxon.B.; R.Geogr.S.; R.S.  
*See Mil. I. Lomb. G.*
- Mil. G. S. Inc.** ..... Giornale della Società d' Incoraggiamento delle Scienze, etc. stabilità in Milano. Milano.  
1808—65. B.M.; Camb.U.
- Mil. I. Lomb. G.** ..... *See Mil. G. I. Lomb.*
- Mil. I. Lomb. Mm.** ..... Memorie dell' I. R. Istituto Lombardo di Scienze, etc. Milano.  
1843— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.; Geol.S.; I.CE.i.; Math.S.i.; N.H.M.; Oxon.B.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.  
*See Mil. Mm. I. Lomb.*
- Mil. I. Lomb. Rd.** ..... Reale Istituto Lombardo di Scienze e Lettere. Rendiconti. Milano.  
1864— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.; Glasg.U.i.; I.CE.i.; Math.S.i.; N.H.M.; Oxon.B.i.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.i.; U.C.L.i.
- Mil. Mm. I. Lomb.** ..... *See Mil. I. Lomb. Mm.*
- Mil. Mm. I. Lomb. Ven.** ..... Memorie dell' I. R. Istituto del regno Lombardo-Veneto. Milano.  
1819—38. B.M.; Camb.U.; N.H.M.; Oxon.B.i.; R.Geogr.S.; R.S.; S.K.  
*See Mil. At. S. It.*
- Mil. S. It. At.** ..... *See Mil. At. S. It.*
- Minn. Ac. Sc. Bll.** ..... Bulletin of the Minnesota Academy of Natural Sciences. Minneapolis, Minn.  
1874— B.M.; Geol.S.i.; N.H.M.; S.K.i.
- Minn. Gl. NH. Sm. Rp.** ..... Geological and Natural History Survey of Minnesota. Annual Reports. Minneapolis.  
1872— B.M.; Camb.U.; Edinb.R.S.i.; Geol.M.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; N.H.M.; Oxon.B.; Oxon.R.i.; P.O.i.; R.Geogr.S.i.; S.K.i.; U.C.L.i.
- Mitau Quatember.** ..... Die Quatember; Zeitschrift für naturwissenschaftl., geschichtl., philolog. und gemischte Gegenstände; von Trautvetter. Mitau.  
1829—30. B.M.
- M. Mcr. J.** ..... The Monthly Microscopical Journal. London.  
1869—77. *Continuation of:* Transactions of the Microscopical Society of London, 1844—68. *Continued as:* Journal of the Royal Microscopical Society, 1878—. B.M.; Camb.U.; Edinb.R.S.; Geol.S.i.; Glasg.U.; N.H.M.; Oxon.R.; P.O.; R.S.; U.C.L.
- Mm. Gl. Sv.** ..... Memoirs of the Geological Survey of Great Britain and of the Museum of Economic Geology in London. London.  
1846— Camb.U.; Dub.R.C.S.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.U.i.; I.CE.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.S.; S.K.; U.C.L.  
*See Gl. Sv. Mm.*
- Mm. Md. Mil.** ..... Recueil de Mémoires de Médecine, de Chirurgie, et de Pharmacie Militaires, rédigé sous le surveillance du Conseil de Santé. Paris.  
1815—82. *Continued as:* Archives de Médecine et de Pharmacie Militaires, 1883—. B.M.; Glasg.U.
- Mn. Mg.** ..... The Mineralogical Magazine and Journal of the Mineralogical Society of Great Britain and Ireland. Truro, London.  
1876— B.M.; Camb.U.; Chem.S.i.; Dub.N.L.I.; Geol.M.; Geol.S.; Glasg.U.; N.H.M.; Oxon.B.(R.); P.O.; R.S.; S.K.
- Mntp. Ac. Mm.** ..... Académie des Sciences et Lettres de Montpellier. Mémoires de la Section des Sciences. Montpellier.
- Mntp. Ac. Sc. Mm.** ..... 1847— B.M.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Linn.S.i.; N.H.M.; Oxon.B.; R.A.S.; R.S.; U.C.L.i.
- Mntp. Mm. Ac.** ..... Recueil des Bulletins publiés par la Société Libre des Sciences, etc., de Montpellier. Montpellier.
- Mntp. Mm. Ac. Sect. Sc.** ..... 1803—14. B.M.; Camb.U.; Oxon.B.i.
- Mntp. Rec. Bll.** ..... Memorie della Regia Accademia di Scienze, Lettere ed Arti di Modena. Modena.  
1833— B.M.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Math.S.i.; N.H.M.; Oxon.B.i.; S.K.i.; U.C.L.i.
- Mod. Ac. Sc. Mm.** ..... Memorie di Matematica e di Fisica della Società Italiana delle Scienze. Modena.
- Mod. Mm. Ac. Sc.** ..... 1782— B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.; Glasg.U.i.; Linn.S.i.; Oxon.B.i.; R.A.S.i.; R.S.; S.K.i.; U.C.L.i.  
*See Rm. S. It. Mm., Verona Mm. S. It. and Verona S. It. Mm.*
- Mod. Mm. S.** ..... *See Rm. S. It. Mm., Verona Mm. S. It. and Verona S. It. Mm.*
- Mod. Mm. S. It.** ..... *See Rm. S. It. Mm., Verona Mm. S. It. and Verona S. It. Mm.*
- Mod. S. It. Mm.** ..... *See Rm. S. It. Mm., Verona Mm. S. It. and Verona S. It. Mm.*

## List of Serial Publications

- Moigno Cosmos** ..... Cosmos. Revue Encyclopédique Hebdomadaire des Progrès des Sciences; Moigno. Paris.  
1852—70. B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; I.CE.i.; N.H.M.; Oxon.B.; P.O.; R.A.S.i.; R.S.; S.K.i.  
*See Cosmos.*
- Moll Efem.** ..... Efemeriden der Berg- und Hüttenkünde; Moll. München.  
1805—09. N.H.M.i.; S.K.
- Mondes (les)** ..... *See Les Mondes.*
- Mon. Sc.** ..... Le Moniteur Scientifique; Quesneville. Paris.  
1857— B.M.; Chem.S.i.; Dub.R.C.S.i.; Oxon.B.; Pharm.S.i.; P.O.; R.A.S.i.
- Mosc. Bil. S. Nt.** ..... Bulletin de la Société Impériale des Naturalistes. Moscou.  
1829— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.; Glasg.U.i.; Linn.S.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.i.; R.A.S.i.; R.S.; S.K.  
*See Mosc. S. Nt. Bil.*
- Mosc. N. Mm.** ..... Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou. Moscou.  
1829— B.M.; Camb.U.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; N.H.M.; R.S.i.; S.K.i.
- Mosc. Obs. A.** ..... Annales de l'Observatoire de Moscou; Bredichin. Moscou.  
1874— B.M.i.; Camb.U.; R.A.S.; R.S.
- Mosc. S. Nt. Bil.** ..... *See Mosc. Bil. S. Nt.*
- Mosc. S. Sc. Bil.** ..... Bulletin of the Imperial Society of Lovers of Natural Science, Anthropology and Ethnography, in connection with the Imperial University of Moscow. [In Russian.] Moscow.  
1865— B.M.i.; Edinb.R.S.i.; N.H.M.i.
- Mosc. Un. Mm.** ..... Scientific Memoirs of the Imperial University of Moscow. [In Russian.] Moscow.  
— B.M.i.; Chem.S.i.; N.H.M.i.
- Mosc. Un. Mm. (Ps.-Mth.)** ..... Scientific Memoirs of the Imperial University of Moscow. Section Phys.-Math. Moscow.  
1880—96. Chem.S.
- Mth. A.** ..... Mathematische Annalen; Clebsch. Leipzig.  
1869— B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.i.; Dub.R.C.S.i.; Dub.R.D.S.i.; Dub.T.C.i.; Edinb.U.; Glasg.U.; Math.S.; Oxon.R.; R.S.; S.K.; U.C.L.
- Mth. Gz.** ..... The Mathematical Gazette. London.  
1894— B.M.; Camb.U.; Math.S.; S.K.; U.C.L.i.
- Mth. Misc.** ..... The Mathematical Miscellany; Gill. New York.  
1836—39. U.C.L.
- Mth. Nt. B. Ung.** ..... Mathematische und naturwissenschaftliche Berichte aus Ungarn. Berlin.  
1882— Camb.P.S.; Chem.S.; Edinb.R.S.; Glasg.U.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.
- Mth. Term. Éts.** ..... Matematikai és természettudományi Értesítő. Kiadja a Magyar Tudományos Akadémia. [Mathematical and Natural Science Report, published by the Hungarian Academy of Science.] Budapest.  
1883— B.M.i.; Edinb.R.S.; N.H.M.; R.S.
- Mth. Term. Éts.** ..... { Matematisk Tidsskrift. Kjøbenhavn.  
1859— B.M.; Camb.U.; Math.S.i.; Oxon.B.; R.S.i.
- Mth. Ts.** ..... { Mittheilungen aus dem Osterlande. Altenburg.  
1837— Camb.U.i.; N.H.M.
- Mt. Ostld.** ..... {
- Mulhouse Bil.** ..... Bulletin de la Société Industrielle de Mulhouse. Mulhouse.  
1828— B.M.i.; Camb.U.i.; Chem.S.i.; Dub.R.C.S.i.; Dub.T.C.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Oxon.B.i.; P.O.
- Mulhouse S. In. Bil.** ..... {
- Münch. Ab.** ..... Abhandlungen der mathematisch-physikalischen Classe der Königl. Bayerischen Akademie der Wissenschaften. München.  
1832— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.U.; I.CE.i.; Linn.S.; Oxon.B.; Oxon.R.; P.O.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.
- Münch. Ak. Ab.** ..... { Sitzungsberichte der Mathematisch-Physikalischen Classe der K. B. Akademie der Wissenschaften zu München. München.  
1871— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.T.C.; Edinb.R.S.; Glasg.U.i.; I.CE.i.; Linn.S.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Münch. Ak. Sb.** ..... {
- Münch. Bil. Ak.** ..... Bulletin der k. Akademie der Wissenschaften. München.

## List of Serial Publications

- 1843—53. B.M.i.; Edinb.R.S.i.; I.CE.i.; Oxon.B.i.; R.A.S.; R.Geogr.S.i.; R.S.  
Denkschriften der Königl. Bayerischen Akademie der Wissenschaften zu München. München u. Salzburg.
- Münch. D.**..... 1808—24. B.M.; Camb.P.S.; Camb.U.; Geol.S.i.; Glasg.U.; N.H.M.; Oxon.R.; P.O.; R.S.; S.K.
- Münch. Gelehrte Az.** ... Gelehrte Anzeigen; herausgegeben von Mitgliedern der Königl. Bayerischen Akademie der Wissenschaften. München.  
1835—60. B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; Oxon.B.; P.O.; R.S.; S.K.
- Münch. Nt. Tech. Com.** Abhandlungen der naturwissenschaftlich-technischen Commission bei der Königl. Bayerischen Akademie. München.  
**Ab.** ..... 1857—58. Camb.U.; R.S.
- Münch. Sb.** ..... Sitzungsberichte der Königl. Bayerischen Akademie der Wissenschaften zu München. München.  
1860—70. B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Geol.S.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; P.O.i.; R.A.S.; R.Geogr.S.; R.S.; S.K.
- Münch. Strnw. N. A.** ... Neue Annalen der k. Sternwarte in Bogenhausen bei München. München.  
1890— B.M.; Edinb.R.S.; R.A.S.; R.S.
- Münch Z. Archt.** ..... Zeitschrift des Bayerischen Architekten- und Ingenieur-Vereins. München.  
1869—77. P.O.
- N. A. Mth.** ..... Nouvelles Annales de Mathématiques. Paris.  
1842— B.M.; Camb.U.; Dub.T.C.; Edinb.U.; Glasg.U.; Math.S.i.; Oxon.B.(R.); R.S.; S.K.; U.C.L.i.
- Nancy Mm. Ac. Stanislas** Académie de Stanislas. Mémoires de la Société [Royale] des Sciences, etc. Nancy.  
1852— *Continuation of:* Mémoires de la Société, etc., 1833—51. B.M.; Camb.U.; Geol.S.i.; Oxon.B.; R.S.i.; S.K.
- Nancy Mm. S. Sc.** ..... Mémoires de la Société [Royale] des Sciences, Lettres, et Arts de Nancy. Nancy.  
1833—51. *Continuation of:* Précis analytique des Travaux de la Société, etc., 1802—32. *Continued as:* Académie de Stanislas. Mémoires, etc., 1852— B.M.; Camb.U.i.; N.H.M.i.; Oxon.B.; R.S.i.; S.K.
- Nancy S. Sc. Bll.** ..... Bulletin de la Société des Sciences de Nancy. Nancy, Paris.  
1873— B.M.; Geol.S.i.; N.H.M.; R.Geogr.S.i.; R.S.
- Nancy Tr. S. Sc.** ..... Précis analytique des Travaux de la Société [Royale] des Sciences, Arts, et Agriculture de Nancy. Nancy.  
1802—32. *Continued as:* Mémoires de la Société, etc., 1833—51. B.M.; Camb.U.i.; Oxon.B.; R.S.i.
- N. Antol. Sc.** ..... Nuova Antologia di Scienze, Lettere ed Arti. Firenze e Roma.  
1866— B.M.; Dub.N.L.I.i.; N.H.M.
- Nap. Ac. Asp. A.** ..... Annali dell' Accademia degli Aspiranti Naturalisti. Napoli.  
1843—47; 1861—69; 1887. Camb.U.i.; N.H.M.; R.S.i.
- Nap. Ac. At.** ..... Atti della Reale Accademia delle Scienze e Belle Lettere; Sezione della Società R. Barbonica. Napoli.  
1819—51. B.M.; Camb.U.; Dub.R.D.S.; Geol.S.i.; N.H.M.; Oxon.B.; R.A.S.i.; R.S.  
Atti della R. Accademia delle Scienze Fisiche e Matematiche. Napoli.  
1863—82; 1888— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.U.i.; Linn.S.i.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; R.A.S.i.; R.S.; S.K.i.
- See **Nap. At. Ac. and Nap. At. Ac. Sc.**  
Atti dell' Accademia Pontaniana di Napoli. Napoli.  
1832— B.M.; Camb.U.; Dub.R.D.S.i.; Glasg.U.i.; N.H.M.; R.S.i.; U.C.L.i.
- Nap. Ac. Pont. At.**.....
- Nap. At. Ac.** ..... )  
**Nap. At. Ac. Sc.** ..... ) See **Nap. Ac. At.**  
**Nap. At. I. Inc.** ..... Atti del Real Istituto d' Incoraggiamento alle Scienze Naturali di Napoli. Napoli.  
1811— B.M.; Camb.U.; Edinb.R.S.i.; I.CE.i.; N.H.M.; Oxon.B.; P.O.; R.S.i.; S.K.i.  
See **Nap. I. Inc. At.**



## List of Serial Publications

- Nap. Bil. Ac. Asp.** ..... *Bulletino dell' Accademia degli Aspiranti Naturalisti.* Napoli.  
1861— Camb.U.i.; N.H.M.
- Nap. I. Inc. At.** ..... *See Nap. At. I. Inc.*
- Nap. Ms.** ..... *Museo di Letteratura e Filosofia; Gatti.* Napoli.  
1842—62. B.M.; Oxon.B.
- Nap. Rd.** ..... *Rendiconto delle adunanze e de' lavori della Reale Accademia delle Scienze [Fis. e Mat.] di Napoli.* Napoli.  
1842—57. B.M.; Camb.U.; Edinb.R.S.i.; Linn.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; R.A.S.i.; R.S.i.
- Nap. Rd.** ..... *Rendiconto dell' Accademia delle Scienze Fisiche e Matematiche.* Napoli.  
1862— Camb.U.; Dub.R.I.A.; Edinb.R.S.; Glasg.U.i.; Linn.S.i.; Math.S.; N.H.M.; Oxon.R.i.; P.O.; R.A.S.; R.S.; U.C.L.i.
- Nap. S. Nt. Bil.** ..... *Bolletino della Società di Naturalisti in Napoli.* Napoli.  
1887— B.M.; Camb.P.S.; N.H.M.; R.S.
- N. Arch. Miss. Sc.** ..... *Nouvelles Archives des Missions Scientifiques et Littéraires.* Paris.  
1891— *Continuation of:* Archives, etc., 1850—89. B.M.; N.H.M.; Oxon.B.; R.Geogr.S.
- N. Arch. Wisk.** ..... *Nieuw Archief voor Wiskunde.* Amsterdam.  
1875— Camb.P.S.i.; Edinb.R.S.i.; Math.S.
- N. A. Sc. Nt.** ..... *Nuovi Annali delle Scienze naturali; Alessandrini, Bertoloni, Gherardi, e Ranzani.* Bologna.  
1838—54. Camb.U.; Geol.S.i.; N.H.M.; Oxon.B.i.; R.Geogr.S.i.; R.S.; S.K.
- Nass. Jb.** ..... *See Bologna N. A.*
- Nass. Vr. Jb.** ..... *Jahrbücher des Vereins für Naturkunde im Herzogthum Nassau.* Wiesbaden.  
1844— B.M.; Camb.P.S.i.; Camb.U.; Linn.S.; N.H.M.; R.S.i.; S.K.
- N. Bergm. J.** ..... *Neues bergmännisches Journal; Kohlen und Hoffmann.* Freiberg.  
1795—1816. B.M.i.; Geol.S.i.; N.H.M.; R.S.; S.K.i.
- N. Brabant Hindl. Prv. Gn.** ..... *Handelingen van het provinciaal Genootschap van Kunsten en Wetenschappen in Noord Brabant.* 's Hertogenbosch.  
1837—57. B.M.; Oxon.B.
- N. Cim.** ..... *Il Nuovo Cimento, Giornale di Fisica, Chimica e Storia Naturale.* Pisa.  
1855— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Edinb.R.S.i.; I.CE.i.; N.H.M.; Oxon.R.i.; P.O.i.; R.S.
- Ndösterr. Gewerb-Vr. Vh.** ..... *Verhandlungen des Niederösterreichischen Gewerb-Vereins.* Wien.  
1840— B.M.i.; P.O.; S.K.i.
- N. Eng. I. Mn. E. T.** ..... *Transactions of the North of England Institute of Mining Engineers.* Newcastle-upon-Tyne.  
1852— B.M.; Camb.U.; Edinb.R.S.i.; Geol.S.; Glasg.U.i.; I.CE.; Oxon.B.i.; P.O.i.; R.S.; S.K.; U.C.L.i.
- Neuch. Bil.** ..... *Bulletin de la Société des Sciences Naturelles de Neuchâtel.* Neuchâtel.
- Neuch. S. Sc. Bil.** ..... *Bulletin de la Société des Sciences Naturelles de Neuchâtel.* Neuchâtel.  
1844— B.M.i.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; N.H.M.; Oxon.B.i.; R.A.S.i.; R.S.i.; S.K.i.
- Newcastle C. S. T.** ..... *Newcastle-upon-Tyne Chemical Society. Transactions.* Newcastle-upon-Tyne.  
1868—83. B.M.; Chem.S.; Oxon.B.; Pharm.S.i.; P.O.; R.S.
- Nhampton. NH. S. J.** ... *Journal of the Northamptonshire Natural History Society and Field Club.* Northampton.  
1880— B.M.; Dub.N.L.L.i.; Geol.S.; N.H.M.
- NH. Rv.** ..... *The Natural History Review and Quarterly Journal of Science.* London and Dublin.  
1854—60. B.M.; Camb.U.; Dub.R.D.S.; Dub.T.C.; Glasg.P.S.; Linn.S.; N.H.M.; Oxon.R.; P.O.; S.K.; U.C.L.i.  
*The Natural History Review; a Quarterly Journal of Biological Science.* London.  
1861—65. B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.P.S.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.; R.S.; S.K.
- Nicholson J.** ..... *Journal of Natural Philosophy, Chemistry, and the Arts; Nicholson.* London.  
1797—1813. B.M.; Camb.U.; Chem.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Edinb.U.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.i.; P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.



## List of Serial Publications

- Nim. S. Sc. Bil.** ..... Bulletin de la Société d'Etude des Sciences Naturelles de Nîmes. Nîmes.  
1873— N.H.M.i.
- N. Jb. Mn.** ..... Neues Jahrbuch für Mineralogie, Geologie und Paläontologie. Stuttgart.  
1863— *Continuation of*: Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde, 1833—62. B.M.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.D.S.i.; Geol.M.; Geol.S.; Glasg.U.; I.CE.i.; N.H.M.; Oxon.R.; R.S.; S.K.i.
- N. Mg. Ntvd.** ..... Nyt Magazin for Naturvidenskaberne. Christiania.  
1838— Camb.U.i.; Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; N.H.M.; R.S.; S.K.
- N. Nord. Arch.** ..... Neues nordisches Archiv für Natur und Arzneikunde, verfasst von einer Gesellschaft nordischer Gelehrten. Frankfurt an der Oder. 1807.
- Nord Mm. S. Ag.** ..... {Mémoires de la Société Centrale d'Agriculture, etc. du Nord, séant à Douai. Douai.  
**Nord S. Ag. Mm.** ..... {1826— B.M.; Camb.U.; Dub.T.C.i.; Oxon.B.i.; R.S.i.
- Northumb. NH. T.** ..... Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne. Newcastle.  
1831—38. B.M.; Camb.P.S.; Camb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.; N.H.M.; Oxon.B.i.; Oxon.R.; R.S.i.; U.C.L.i.  
Natural History Transactions of Northumberland and Durham. London, Newcastle.  
1865— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Geol.S.; Glasg.U.; Linn.S.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.i.; S.K.; U.C.L.i.
- N. Rs. S. Nt. Mm.** ..... Mémoires de la Société des Naturalistes de la Nouvelle-Russie. [In Russian.] Odessa.  
1872— B.M.; Camb.P.S.i.; Edinb.R.S.i.; Geol.S.; Linn.S.i.; N.H.M.; R.S.i.
- N. Rs. S. Nt. Mm. (Mth.)** ..... Memoirs of the Mathematical Section of the New Russian Society of Naturalists. [In Russian.] Odessa.  
1878— Dub.R.I.A.; Math.S.i.; R.S.i.
- N. Scotia I. Sc. P. & T.** ..... Proceedings and Transactions of the Nova Scotian Institute of Natural Science. Halifax, Nova Scotia.  
1863— Camb.P.S.i.; Chem.S.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.i.; N.H.M.; Pharm.S.i.; P.O.i.; R.S.i.; U.C.L.i.
- N. S. W. L. S. P.** ..... The Proceedings of the Linnean Society of New South Wales. Sydney.  
1876— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Edinb.R.S.; Geol.S.; Linn.S.; N.H.M.; Oxon.R.i.; R.S.; S.K.i.
- N. S. W. R. S. J.** ..... Journal and Proceedings of the Royal Society of New South Wales. Sydney.  
1876— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.T.C.; Edinb.R.S.i.; Geol.M.i.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; Pharm.S.i.; P.O.i.; R.A.S.; R.Geogr.S.; R.S.; S.K.
- N. S. W. R. S. T.** ..... Transactions of the Royal Society of New South Wales. Sydney.  
1867—75. B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.i.; Geol.M.i.; Edinb.R.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.i.
- Nt.** ..... Nature: a weekly illustrated Journal of Science. London.  
1870— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.i.; I.CE.; Linn.S.; Oxon.B.; Oxon.R.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Ntleza.** ..... La Naturaleza. Periódico científico de la Sociedad Mexicana de Historia Natural. México.  
1870— B.M.i.; Edinb.R.S.i.; Geol.S.i.; N.H.M.i.
- N. Ts. Mth.** ..... Nyt Tidsskrift for Mathematik. Kjøbenhavn.  
1890— *Continuation of*: Tidsskrift for Mathematik, 1859—89. B.M.; Math.S.i.
- Nv. Archt. T.** ..... Transactions of the Institution of Naval Architects. London.  
1860— B.M.; Camb.U.; Dub.R.I.A.; Edinb.U.; Glasg.U.; I.CE.; P.O.; R.S.; S.K.i.; U.C.L.i.

## List of Serial Publications

- N.-Vorp. Mt.** ..... Mittheilungen aus dem Naturwissenschaftlichen Vereine von Neu-Vorpommern und Rügen. Berlin.  
1869— B.M.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; N.H.M.; S.K.
- Nv. Sc.** ..... Naval Science: a Quarterly Magazine for promoting the improvement of Naval Architecture, Marine Engineering, Steam Navigation and Seamanship. London.  
1872—76. B.M.i.; Camb.U.i.; Glasg.U.i.; I.CE.i.; Oxon.B.i.; P.O.; S.K.
- N. Y. Ac. A.** ..... Annals of the New York Academy of Sciences, late Lyceum of Natural History. New York.  
1879— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Geol.S.; Linn.S.i.; N.H.M.; Oxon.R.i.; P.O.; R.S.; S.K.; U.C.L.i.
- N. Y. Ac. T.** ..... Transactions of the New York Academy of Sciences, late Lyceum of Natural History. New York.  
1881—98. B.M.; Glasg.U.i.; Linn.S.i.; N.H.M.; Oxon.R.i.; P.O.i.; R.S.; S.K.; U.C.L.i.
- N. Y. Ag. S. T.** ..... Transactions of the New York State Agricultural Society. Albany.  
1842— B.M.; I.CE.i.; P.O.i.; R.Geogr.S.i.; R.S.i.
- N. Y. A. Lyceum** ..... Annals of the Lyceum of Natural History of New York. New York.  
1824—77. *Continued as:* Annals of the New York Academy of Sciences, 1879— B.M.; Camb.U.; Dub.R.D.S.; Edinb.R.S.i.; Geol.S.i.; Linn.S.; N.H.M.; Oxon.R.i.; P.O.; R.S.; S.K.  
*See N. Y. Lyceum A.*
- N. Y. Am. Mth. S. Bil.** ..... Bulletin of the American Mathematical Society. New York.  
1895— *Continuation of:* Bulletin of the New York Mathematical Society, 1892—94. B.M.; Camb.P.S.; Camb.U.; Dub.T.C.; Edinb.R.S.; Glasg.U.; Glasg.P.S.; Math.S.; Oxon.B.; Oxon.R.; R.S.i.
- N. Y. Am. Mth. S. T.** ... Transactions of the American Mathematical Society. Lancaster, Pa. and New York.  
1900— Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Glasg.U.; Math.S.; Oxon.B.; Oxon.R.; R.S.; S.K.
- N. Y. Lyceum A.** ..... *See N. Y. A. Lyceum.*
- N. Y. Mth. S. Bil.** ..... Bulletin of the New York Mathematical Society. New York.  
1892—94. *Continued as:* Bulletin of the American Mathematical Society, 1895— B.M.; Camb.P.S.; Camb.U.; Edinb.R.S.; Glasg.P.S.; Glasg.U.; Math.S.; Oxon.B.; Oxon.R.; R.A.S.
- N. Z. I. T.** ..... Transactions and Proceedings of the New Zealand Institute. Wellington.  
1868— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.; R.S.; S.K.i.; U.C.L.i.
- Obs.** ..... The Observatory. A monthly Review of Astronomy. London.  
1878— Camb.P.S.; Camb.U.; Dub.T.C.i.; Edinb.R.S.; Oxon.R.; P.O.; R.A.S.; S.K.
- Oestr. Z. Brgw.** ..... Oesterreichische Zeitschrift für Berg- und Hüttenwesen; von Otto Freiherrn von Hingenau. Wien.  
1853— B.M.; I.CE.; P.O.; S.K.
- Offenb. Vr. Nt. B.** ..... Bericht über die Thätigkeit des Offenbacher Vereins für Naturkunde. Offenbach a. M.  
1860— Edinb.R.S.i.; Geol.S.i.; Linn.S.i.; N.H.M.; R.S.i.; S.K.i.
- Oise Mm. S. Ac.** ..... Mémoires de la Société Académique d'Archéologie, Sciences, et Arts du département de l'Oise. Beauvais.  
1847— B.M.; N.H.M.i.; Oxon.B.; R.S.i.
- Oken Isis** ..... Isis, oder Encyclopädische Zeitung; Oken. Jena.  
1817—48. B.M.i.; Camb.U.; Edinb.U.; Glasg.U.; Linn.S.i.; N.H.M.; Oxon.B.(R.); R.S.; S.K.i.
- Opusc. Mt. Fis.** ..... Opuscoli matematici e fisici di diversi Autori. Milano.  
1832—34. R.S.
- Orléans A.** ..... Annales de la Société Royale des Sciences, Belles-Lettres, et Arts d'Orléans. Orléans.  
1818—37. B.M.; Oxon.B.; R.S.
- Orléans Bil.** ..... Bulletin des Sciences Physiques, Médicales, et d'Agriculture d'Orléans. Orléans.  
1810—13. B.M.; Oxon.B.

## List of Serial Publications

- Örsted Ts.**..... Tidsskrift for Naturvidenskaberne; Ørsted. Kjöbenhavn.  
1822—28. B.M.; Camb.U.; N.H.M.; R.S.
- Orv.-Termt. Éts. (Termt. Szak)** ..... Orvos-Természettudományi Értesítő a Kolozsvári Orvos-Természettudományi Társulat és az Erdélyi Múzeum-Egylet Természettudományi Szakosztályának..... [Medical and Natural History Proceedings of the Sections of the Klausenburg Medical and Natural History Society and of the Natural History Section of the Museum Association of Transylvania.] Kolozsvár [Klausenburg]. 1879— N.H.M.; R.S.i.
- Padova Ac. At. e Mm.** ... Atti e Memorie della R. Accademia di Scienze, Lettere ed Arti in Padova. Nuova serie. Padova.  
1885— *Continuation of*: Nuovi Saggi dell' Accademia, etc. 1817—83. Edinb.R.S.; Geol.S.i.; N.H.M.
- Padova Mm. Ac.** ..... Memorie dell' Accademia di Scienze, Lettere, ed Arti di Padova. Padova.  
1809. B.M.; Camb.U.; N.H.M.; Oxon.B.; R.S.; S.K.
- Padova N. Sag.** ..... Nuovi Saggi dell' Accademia di Scienze, Lettere, ed Arti di Padova. Padova.  
1817—83. *Continued as*: Atti e Memorie della R. Accademia, etc., 1885— B.M.i.; Camb.U.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; N.H.M.; Oxon.B.i.; R.S.i.; S.K.i.
- Padova S. Sc. Bll.** ..... Bollettino della Società Veneto-Trentina di Scienze Naturali. Padova.  
1879— B.M.; N.H.M.
- Palermo Ac. At.** ..... (Atti dell' Accademia di Scienze, Lettere ed Arti di Palermo. Palermo.  
1845— B.M.; Camb.U.i.; Dub.R.I.A.; Dub.T.C.; Glasg.U.i.; N.H.M.; Oxon.B.i.; R.A.S.i.; R.S.
- Palermo At.** ..... Rendiconti del Circolo Matematico di Palermo. Palermo.  
1887— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Math.S.; R.S.
- Palermo Cir. Mt. Rd.** ...
- Palermo G. Sc. Nt.** ..... Giornale di Scienze naturali ed economiche, pubblicato per cura del Consiglio di Perfezionamento annesso al R. Istituto Tecnico di Palermo. Palermo.  
1865— B.M.; Camb.U.; Dub.R.D.S.i.; Geol.S.i.; R.S.
- Palomba Rac.** ..... Raccolta di Lettere, etc. intorno alla Fisica ed alle Mathematiche; Palomba. Roma.  
1845—48. B.M.i.
- Par. A. Cons.** ..... Annales du Conservatoire des Arts et Métiers. Paris.  
1861— B.M.; Camb.U.; Glasg.P.S.i.; I.CE.i.; Oxon.B.; P.O.; R.S.; S.K.i.  
*See A. Cons. Arts et Mét.*
- Par. Ac. Sc. Mm.** ..... Mémoires de l'Académie des Sciences de l'Institut de France. Paris.  
1816— B.M.; Camb.U.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.T.C.i.; Edinb.R.S.i.; Edinb.U.; Geol.S.i.; Glasg.U.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.A.S.i.; R.S.; S.K.; U.C.L.
- Par. A. das Sc.** ..... Annaes das Sciencias, etc. por huma Sociedade de Portuguezes residentes em Paris. Paris.  
1818—27. B.M.; Camb.U.i.  
*See A. das Sc.*
- Par. A. Éc. Norm.** ..... Annales scientifiques de l'École Normale Supérieure. Paris.  
1864— B.M.; Camb.P.S.i.; Camb.U.; Dub.N.L.I.i.; Dub.R.C.S.i.; Dub.R.D.S.i.; Edinb.R.S.i.; Edinb.U.i.; Glasg.U.i.; Oxon.B.; R.S.; S.K.  
*See Par. Éc. Norm. A.*
- Par. An. Mét.** ..... (Annuaire de la Société Météorologique de France. Paris.  
1853— *Continuation of*: Annuaire Météorologique de la France, 1849—52. B.M.; Camb.U.i.; Dub.T.C.i.; Edinb.R.S.i.; R.S.i.; S.K.i.
- Par. An. S. Mét.** .....
- Par. A. Obs.** ..... Annales de l'Observatoire de Paris; mémoires publiées par U. J. Le Verrier. Paris.  
1855— B.M.; Camb.U.; Dub.N.L.I.; Dub.T.C.; Edinb.R.S.; Glasg.U.i.; Oxon.B.; R.A.S.; R.S.  
*See Par. Obs. A. and Par. Obs. A. (Mm.)*
- Par. A. Pon. Chauss.** ..... Annales des Ponts et Chaussées. Mémoires et documents relatifs à l'Art des Constructions et au Service de l'Ingénieur. Paris.

## List of Serial Publications

- 1831— B.M.; Camb.U.; Edinb.U.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; P.O.; R.S.i.  
*See A. Pon. Chauss.*  
**Par. Bil. S. Aérost.** ..... Bulletin de la Société Aérostatique et Météorologique de France. Paris.  
1852—53. B.M.  
**Par. Bil. S. Encour.** ..... Bulletin de la Société d'Encouragement pour l'Industrie Nationale. Paris.  
1802— Camb.U.; Dub.R.C.S.i.; Dub.T.C.i.; Edinb.R.S.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; Oxon.B.; P.O.; R.S.; S.K.i.  
**Par. Bil. S. Gg.** ..... Bulletin de la Société de Géographie. Paris.  
1822— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; N.H.M.; Oxon.B.; R.Geogr.S.; R.S.; U.C.L.i.  
*See Par. Gg. S. Bil. and Par. S. Gg. Bil.*  
**Par. Bil. S. Phlm.** ..... Bulletin des Sciences de la Société Philomathique de Paris. Paris.  
1791—1805; 1814—24; 1864— B.M.i.; Camb.U.; Dub.T.C.i.; Edinb.R.S.i.; Glasg.U.i.; Math.S.i.; N.H.M.; Oxon.R.i.; P.O.i.; R.A.S.i.; R.S.; U.C.L.  
*See Par. S. Phlm. Bil.*  
**Par. Bur. Long. A.** ..... Annales du Bureau des Longitudes. Paris.  
1877— B.M.; R.A.S.i.; R.S.  
**Par. Bur. Long. An.** ..... Annuaire pour l'an...publié par le Bureau des Longitudes. Paris.  
1799— B.M.; Camb.U.i.; Glasg.U.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.  
**Par. Éc. Norm. A.** ..... *See Par. A. Éc. Norm.*  
**Par. Éc. Pol. Cor.** ..... Correspondance sur l'École Polytechnique, à l'usage des Élèves de cette École; Hachette. Paris.  
1808—16. B.M.i.; Oxon.B.; R.S.; U.C.L.  
**Par. Éc. Pol. J.** ..... Journal de l'École Polytechnique. Paris.  
1795— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Glasg.P.S.i.; Glasg.U.; I.CE.i.; Linn.S.i.; Math.S.i.; Oxon.B.(R.); P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.i.  
*See Par. J. Éc. Pol.*  
**Par. Gg. S. Bil.** ..... *See Par. Bil. S. Gg. and Par. S. Gg. Bil.*  
**Par. Ing. Civ. Mm.** ..... Mémoires et Comptes Rendus des Travaux de la Société des Ingénieurs Civils. Paris.  
1848— B.M.; Glasg.U.i.; I.CE.; P.O.  
*See Par. Mm. Ing. Civ.*  
**Par. J. Éc. Pol.** ..... *See Par. Éc. Pol. J.*  
**Par. Mm. Ac. Sc.** ..... *See Par. Ac. Sc. Mm.*  
**Par. Mm. de l'I.** ..... Mémoires de la Classe des Sciences mathématiques et physiques de l'Institut. Paris.  
1798—1815. B.M.; Edinb.R.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.i.; S.K.; U.C.L.  
**Par. Mm. Ing. Civ.** ..... *See Par. Ing. Civ. Mm.*  
**Par. Mm. Sav. Étr.** ..... Mémoires présentés à l'Institut des Sciences, Lettres et Arts par divers Savans, et lus dans ses Assemblées: Sciences Mathématiques et Physiques. Paris.  
1806—11. B.M.; Camb.U.; Dub.R.D.S.; Dub.T.C.; Edinb.R.S.; Glasg.U.; I.CE.i.; N.H.M.; Oxon.R.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.  
**Par. Mm. S. Sav.** ..... Mémoires présentés par divers Savans à l'Académie des Sciences de l'Institut de France. Paris.  
1827— B.M.; Camb.U.; Dub.T.C.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.A.S.i.; R.S.; S.K.  
**Par. Mm. S. Sav.** ..... Mémoires des Sociétés Savantes et Littéraires de la République Française. Recueillis et rédigés par les Citoyens Prony, etc. Paris.  
1801—02. B.M.; Oxon.B.; R.S.  
**Par. Obs. A.** ..... } *See Par. A. Obs.*  
**Par. Obs. A. (Mm.)** ..... }  
**Par. Obs. Monts. An.** ..... Annuaire (Météorologique et Agricole) de l'Observatoire de Montsouris. Paris.  
1872— B.M.; Chem.S.i.; Glasg.P.S.i.; R.S.i.  
**Par. Poids et Mes. PV.** ..... Comité International des Poids et Mesures. Procès-Verbaux des Séances. Paris.



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- 1875— Camb.P.S.; Camb.U.i.; Dub.R.D.S.; Glasg.U.i.; Oxon.R.; P.O.; R.A.S.; R.S.; S.K.i.
- Par. Poidset Mes. Tr. Mm.** Travaux et Mémoires du Bureau International des Poids et Mesures. Paris.
- 1881— Camb.P.S.; Camb.U.; Chem.S.; Glasg.U.i.; I.CE.i.; Oxon.B.; Oxon.R.; R.S.; S.K.; U.C.L.
- Par. S. Accl. Bil.** Bulletin de la Société Zoologique d'Acclimatation. Paris.
- 1854— B.M.; Pharm.S.i.
- Par. S. Bil. Mm.** Comptes Rendus des Séances et Mémoires de la Société de Biologie. Paris.
- 1849— B.M.i.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Glasg.U.i.; N.H.M.; Oxon.R.; R.S.i.; S.K.i.
- Par. S. C. Bil.** Bulletin de la Société Chimique de Paris. Paris.
- 1858— B.M.; Camb.U.i.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.; Dub.R.D.S.i.; Glasg.U.i.; N.H.M.; Oxon.R.; Pharm.S.i.; P.O.; R.S.; S.K.
- Par. S. Gg. Bil.** See **Par. Bil. S. Gg. and Par. Gg. S. Bil.**
- Par. S. Gl. Bil.** Bulletin de la Société Géologique de France. Paris.
- 1830— B.M.; Camb.U.i.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.; N.H.M.; Oxon.B.; Oxon.R.; R.S.; S.K.i.; U.C.L.i.
- Par. S. Mth. Bil.** Bulletin de la Société Mathématique de France. Paris.
- 1873— B.M.; Camb.P.S.; Camb.U.; Edinb.R.S.; Math.S.; Oxon.R.; R.A.S.; R.S.
- Par. S. Phlm. Bil.** See **Par. Bil. S. Phlm.**
- Par. S. Phlm. Mm. Cent.** Mémoires publiés par la Société Philomathique à l'occasion du Centenaire de sa Fondation. Paris.
1888. B.M.; Edinb.R.S.; N.H.M.; R.A.S.; R.S.
- Par. S. Phlm. N. Bil.** Nouveau Bulletin des Sciences de la Société Philomathique de Paris. Paris.
- 1807—1813; 1825—26; 1832—33. B.M.i.; Camb.U.; Dub.T.C.; N.H.M.; P.O.i.; R.S.; U.C.L.
- Par. S. Phlm. FV.** Extraits des Procès-Verbaux des Séances de la Société Philomathique. Paris.
- 1836—63. N.H.M.; R.S.
- Par. S. Ps. Sé.** Séances de la Société Française de Physique. Paris.
- 1873— B.M.i.; Camb.P.S.i.; Glasg.U.i.; P.O.; R.S.; S.K.
- Par. T. Nauk Śc. Pam.** Pamiętnik Towarzystwa Nauk Ścisłych w Paryżu. Paris.
- 1871—82. B.M.; N.H.M.
- Peterm. Mt.** Mittheilungen aus Justus Perthes' Geographischer Anstalt über wichtige neue Erforschungen auf dem Gesamtgebiete der Geographie; Petermann. Gotha.
- 1855— B.M.; Camb.U.; Dub.R.C.S.; Geol.M.i.; Geol.S.; Glasg.P.S.i.; Glasg.U.; N.H.M.i.; Oxon.B.; Oxon.R.; R.Geogr.S.; R.S.; S.K.; U.C.L.i.
- Pflüg. Arch. Pl.** Archiv für die gesammte Physiologie des Menschen und der Thiere; Pflüger. Bonn.
- 1868— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Glasg.U.i.; N.H.M.i.; Oxon.R.; R.S.; S.K.; U.C.L.
- Philad. Ac. Nt. Sc. J.** Journal of the Academy of Natural Sciences of Philadelphia. Philadelphia.
- 1817— B.M.; Camb.U.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.S.i.; S.K.i.
- Philad. Ac. Nt. Sc. P.** Proceedings of the Academy of Natural Sciences of Philadelphia. Philadelphia.
- 1841— B.M.i.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.; Glasg.P.S.; Linn.S.i.; N.H.M.; Oxon.R.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.i.
- Philad. Coll. Phm. J.** Journal of the Philadelphia College of Pharmacy. Philadelphia.
- Philad. J. Coll. Phm.** 1830—35. Glasg.P.S.; Pharm.S.
- Philad. T.** Transactions of the American Philosophical Society. Philadelphia.
- 1771— B.M.i.; Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.i.; Oxon.B.; Oxon.R.i.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.i.; U.C.L.i.
- See **Am. Ph. S. T.**

## List of Serial Publications

- Phil. Trans.**..... Philosophical Transactions of the Royal Society of London. London.  
1665— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.R.C.S.;  
Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.  
S.i.; Glasg.P.S.; Glasg.U.i.; I.CE.; Linn.S.i.; Math.S.i.;  
N.H.M.; Oxon.B.; Oxon.R.; Pharm.S.i.; P.O.; R.A.S.i.;  
R.Geogr.S.i.; R.S.; S.K.; U.C.L.i.
- Ph. Mg.**..... The London, Edinburgh, and Dublin Philosophical Magazine and  
Journal of Science. London.  
1827— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.D.S.; Dub.  
R.I.A.; Edinb.R.S.; Edinb.U.; Geol.M.i.; Geol.S.; Glasg.P.S.i.;  
Glasg.U.; I.CE.; Linn.S.i.; Math.S.i.; N.H.M.; Oxon.B.;  
Oxon.R.; Pharm.S.i.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.
- Phm. J.**..... The Pharmaceutical Journal and Transactions. London.  
1841— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.T.C.i.;  
Glasg.P.S.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.B.(R.);  
Pharm.S.; R.S.i.; S.K.i.; U.C.L.
- Phm. Z. Russl.**..... Pharmaceutische Zeitschrift für Russland. St Petersburg.  
1862— B.M.; P.O.
- Phot. J.**..... The Photographic Journal, including the Transactions of the  
Photographic Society of Great Britain. London.  
1877— *Continuation of:* The Journal of the Photographic Society  
of London, 1854—76. B.M.; Camb.U.i.; Chem.S.; Dub.T.C.i.;  
Edinb.R.S.i.; Geol.S.; Glasg.P.S.; I.CE.i.; Oxon.B.; Pharm.S.i.;  
P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.i.
- Ph. Stud.**..... Philosophische Studien herausgegeben von Wilhelm Wundt.  
Leipzig.  
1883—Camb.U.; Dub.T.C.; Edinb.U.; Glasg.U.; Oxon.B.; R.S.;  
U.C.L.
- Pisa A. Scuola Norm.**... Annali della R. Scuola Normale Superiore di Pisa. Scienze Fisiche  
e Matematiche. Pisa.  
1871. Math.S.i.; Oxon.B.; Oxon.R.; R.S.
- Pisa N. G.**..... Nuovo Giornale de' Letterati. Pisa.  
1822—39. B.M.; Camb.U.; Oxon.B.
- Plym. I. T.**..... Annual Reports and Transactions of the Plymouth Institution and  
Devon and Cornwall Natural History Society. Plymouth.  
1855— Camb.U.i.; Dub.N.L.I.i.; Edinb.R.S.i.; Linn.S.i.; N.H.M.;  
Oxon.B.i.; R.S.; S.K.; U.C.L.i.
- Pogg. A.**..... Annalen der Physik und Chemie; Poggendorff, Wiedemann.  
Leipzig.  
1824—99. *Continued as:* Annalen der Physik; Drude. 1900—  
B.M.; Camb.P.S.i.; Camb.U.; Chem.S.; Dub.R.I.A.; Dub.T.C.;  
Edinb.R.S.; Edinb.U.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; N.H.M.;  
Oxon.B.(R.); Pharm.S.i.; P.O.; R.S.; S.K.; U.C.L.i.  
*See A. Ps. C.*
- Poligrafo**..... Il Poligrafo: Giornale di Scienze, Lettere, ed Arti; Orti. Verona.  
1830—45. B.M.; Oxon.B.
- Pollich.**..... Jahresbericht der Pollichia eines Naturwissenschaftlichen Vereins  
der Rheinpalz. Dürkheim a. d. Haardt.  
1843— Camb.U.; Linn.S.; N.H.M.; R.S.i.
- Pol. Mt.**..... Polytechnische Mittheilungen, unter Mitwirkung von Professoren  
höherer technischer Lehranstalten. Tübingen.  
1844—46. B.M.; R.S.
- Pop. As.**..... Popular Astronomy. Northfield, Minnesota.  
1894— B.M.; Glasg.U.; R.A.S.; S.K.
- Pop. Sc. Rv.**..... The Popular Science Review: a Quarterly Miscellany of enter-  
taining and instructive articles on Scientific Subjects; Samuelson.  
London.  
1861—81. B.M.; Camb.U.; Dub.R.D.S.; Dub.T.C.; Geol.M.;  
Geol.S.i.; Glasg.U.i.; I.CE.; Linn.S.; N.H.M.; Oxon.B.;  
Oxon.R.i.; Pharm.S.i.; P.O.; R.S.i.; S.K.
- Pp. Nv. Archt.**..... Papers on Naval Architecture and other subjects connected with  
Naval Science; Morgan and Creuze. London.  
1827—32. B.M.; P.O.; R.S.
- Prace Mt.-Fiz.**..... Prace Matematyczno-Fizyczne. Warsaw.  
1888— Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.i.; Math.S.;  
R.S.i.
- Practit.**..... The Practitioner. London, Paris, New York, Melbourne.  
1868— B.M.; Camb.U.; Glasg.U.i.; Oxon.B.; Pharm.S.i.

## List of Serial Publications

- Prag Ab.** ..... Abhandlungen der k. Böhmischen Gesellschaft der Wissenschaften. Prag.  
1804—92. B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.i.; Edinb. R.S.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.; R.S.i.; S.K.i.  
*See Böhm. Gs. Ab.*
- Prag České Ak. Fr. Jos. Pam.** ..... Památník na oslavu padesátiletého panovníckého jubilea jeho veličenstva císaře a krále Františka Josefa I. Vydala Česká Akademie Císaře Františka Josefa pro Vědy, Slovesnost a Umění. [Memoirs in honour of the jubilee of his Imperial and Royal Majesty Franz Joseph I. Edited by the Imperial Bohemian Franz-Joseph Academy of Sciences, Literature and Art.] Prazé. (Prag.)  
1898. Camb.P.S.; N.H.M.
- Prag České Ak. Fr. Jos. Rz.** ..... Rozprawy České Akademie Císaře Františka Josefa Pro Vědy, Slovesnost a Umění. [Memoirs of the Imperial Bohemian Franz-Joseph Academy of Sciences, Literature and Art.] Prag.  
1891— B.M.; Edinb.R.S.; N.H.M.i.; U.C.L.i.
- Prag Jb. Böhm. Ms.** ..... Jahrbücher des Böhmischen Museums für Natur- und Länderkunde, etc. Prag.  
1830—31. B.M.; N.H.M.
- Prag Sb.** ..... Sitzungsberichte der k. Böhmischen Gesellschaft der Wissenschaften in Prag. Prag.  
1859— Camb.P.S.; Camb.U.i.; Dub.R.D.S.; Dub.R.I.A.; Edinb. R.S.i.; Linn.S.i.; N.H.M.; R.S.; S.K.; U.C.L.i.
- Presse Sc.** ..... Presse Scientifique des Deux Mondes. Paris.  
1860—66. B.M.; R.S.i.
- Pr. Geod. I. Vöff.** ..... Veröffentlichung des Königl. Preussischen Geodätischen Instituts. Berlin.  
1886— Camb.U.i.; R.A.S.; R.Geogr.S.; R.S.i.
- Prth. S. Sc. P.** ..... Proceedings of the Perthshire Society of Natural Science. Perth.  
1869—70; 1881— B.M.i.; Camb.U.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.
- Ps. Mdd.** ..... Fysikalske Meddelelser: Arndtsen. Christiania.  
1858.
- Ps. Rv.** ..... The Physical Review. New York, London, Berlin.  
1894— B.M.; Camb.P.S.; Camb.U.; Dub.R.C.S.; Edinb.R.S.; Edinb.U.i.; Glasg.U.; Oxon.R.; P.O.; R.S.; S.K.
- Ps. Z.** ..... Fysikalische Zeitschrift. Leipzig.  
1899— Camb.P.S.; Edinb.U.; Glasg.U.; Oxon.R.; R.S.; S.K.; U.C.L.i.
- Ptsd. Asps. Obs. Fb.** ..... Publicationen des Astrophysikalischen Observatoriums zu Potsdam. Potsdam.  
1878— B.M.; Camb.U.; Dub.R.D.S.; Oxon.R.; R.A.S.; R.S.
- QJ. Mth.** ..... The Quarterly Journal of Pure and Applied Mathematics. London.  
1855— B.M.; Camb.P.S.; Camb.U.; Dub.N.L.I.; Dub.T.C.; Edinb.R.S.i.; Edinb.U.; Glasg.P.S.i.; Glasg.U.; I.CE.i.; Math. S.i.; Oxon.B.; Oxon.R.; P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.
- QJ. Sc.** ..... The Journal of Science and the Arts; edited at the Royal Institution of Great Britain. London. *Continued as:* Quarterly Journal of Science, Literature and Arts. London.  
1816—30. B.M.; Camb.U.; Chem.S.; Dub.T.C.; Edinb.R.S.; Glasg.U.i.; I.CE.; Oxon.B.; Oxon.R.; Pharm.S.; R.S.; S.K.; U.C.L.
- Quek. Micr. Cl. J.** ..... Journal of the Quekett Microscopical Club. London.  
1868— B.M.; Camb.U.; Dub.R.D.S.; Geol.S.i.; Linn.S.i.; N.H.M.; Oxon.B.(R.); P.O.; R.S.; S.K.; U.C.L.
- Quetelet Cor. Mth.** ..... Correspondance Mathématique et Physique; publiée par MM. Garnier et Quetelet. Gand et Bruxelles.  
1825—39. B.M.; Camb.U.; R.A.S.i.; R.S.; U.C.L.
- Railroad & Eng. J.** ..... The Railroad and Engineering Journal. New York.  
1887—92. *Continuation of:* Van Nostrand's Engineering Magazine, 1869—85. *Continued as:* American Engineer and Railroad Journal, 1893— B.M.; I.CE.; P.O.
- Ranuzzi An. Gg.** ..... Annuario geografico Italiano; Ranuzzi. Bologna.  
1844—45. B.M.; Camb.U.; R.Geogr.S.

## List of Serial Publications

- Rch. Chron.** ..... Recherches Chronométriques; publiées sous la direction du Ministre de la Marine. Paris.  
1854—62.
- Rec. Mth. (Moscou)** ..... Recueil mathématique. Publié par la Société Mathématique de Moscou. [In Russian.] Moscou.  
1866— R.S.
- Rec. Tr. C. P.-Bas** ..... Recueil des Travaux Chimiques des Pays-Bas [et de la Belgique]. Leide.  
1882— Chem.S.; Oxon.R.; P.O.; S.K.
- Reims Sé. Ac.** ..... Séances et Travaux de l'Académie de Reims. Reims.  
1844— B.M.i.; N.H.M.i.; Oxon.B.
- R. E. Pp.** ..... Papers on subjects connected with the duties of the Corps of Royal Engineers. London.  
1843— Camb.U.; Geol.M.i.; I.CE.; P.O.i.; S.K.i.
- Rheinl. Westphal. Sb.** ... Sitzungsbericht des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Bonn.  
1844— Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.i.; Linn.S.i.; N.H.M.; Oxon.R.; R.S.i.; S.K.i.
- Riga Cor.-Bl.** ..... Correspondenzblatt des Naturforscher-Vereins zu Riga. Riga.  
1846— B.M.; Dub.R.I.A.i.; N.H.M.; R.S.i.
- R. I. J.** ..... Journal of the Royal Institution of Great Britain. London.  
1802—03; 1830—31. Camb.U.i.; Chem.S.i.; Dub.R.D.S.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.i.; Oxon.R.; Pharm.S.i.; P.O.i.; R.A.S.i.; R.S.; U.C.L.i.
- Rio Obs. Rv.** ..... Revista do Observatorio Publicação Mensal do Imperial Observatorio do Rio de Janeiro. Rio de Janeiro.  
1886— Dub.R.D.S.i.; Edinb.R.S.i.; R.A.S.; R.S.
- Rio Rv.** ..... Revista trimestral de Historia e Geografia: Jornal do Instituto Historico e Geographico Brasileiro. Rio de Janeiro.  
1839— B.M.; R.Geogr.S.i.
- R. I. P.** ..... Notice of the Proceedings at the meetings of the members of the Royal Institution, with Abstracts of the Discourses delivered at the Evening Meetings. London.  
1851— B.M.; Camb.U.; Chem.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.i.; I.CE.i.; Linn.S.; N.H.M.; Oxon.R.; Pharm.S.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Rm. At.** ..... Atti dell' Accademia Pontificia dei Nuovi Lincei. Roma.  
**Rm. At. N. Linc.** ..... 1847— B.M.; Dub.R.I.A.; Edinb.R.S.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.i.; R.A.S.i.; R.Geogr.S.i.; R.S.  
See **Rm. N. Linc. At.**
- Rm. At. R. Ac.** ..... Atti della Reale Accademia dei Lincei. Roma.  
1870—83. B.M.; Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.D.S.; Dub.R.I.A.; Glasg.U.i.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; R.A.S.i.; R.Geogr.S.; R.S.; S.K.i.; U.C.L.i.  
See **Rm. R. Ac. Linc. At.**
- Rm. Cor. Sc.** ..... Corrispondenza Scientifica in Roma per le avanzamento delle Scienze, etc. Roma.  
1848—  
See **Rm. Sc. Cor.**
- Rm. N. Linc. At.** ..... See **Rm. At. and Rm. At. N. Linc.**
- Rm. N. Linc. Mm.** ..... Memorie della Pontificia Accademia dei Nuovi Lincei. Roma.  
1887— Dub.R.D.S.; Dub.R.I.A.; Edinb.R.S.; N.H.M.; R.S.
- Rm. R. Ac. Linc. At.** ..... See **Rm. At. R. Ac.**
- Rm. R. Ac. Linc. Mm.** ... Atti della R. Accademia dei Lincei. Memorie della Classe di Scienze fisiche, matematiche e naturali. Roma.  
1877— B.M.i.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.; Glasg.P.S.i.; Glasg.U.; Linn.S.; Math.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.i.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Rm. R. Ac. Linc. Rd.** ..... Atti della R. Accademia dei Lincei. Rendiconti. Roma.  
1885— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.T.C.; Edinb.R.S.; Geol.S.; Glasg.U.; Linn.S.; Math.S.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Rm. R. Ac. Linc. T.** ..... Atti della R. Accademia dei Lincei. Transunti. Roma.  
1877—84. B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.R.I.A.; Edinb.R.S.; Geol.S.; Glasg.P.S.i.; Glasg.U.; Linn.S.; Math.S.; N.H.M.; Oxon.B.; Oxon.R.; R.A.S.; R.Geogr.S.; R.S.; S.K.i.; U.C.L.



## List of Serial Publications

- Rm. Sc. Cor.** ..... See **Rm. Cor. Sc.**
- Rm. S. It. Mm.** ..... *Memorie di Matematica e di Fisica, della Società Italiana delle Scienze.* Napoli e Roma.  
1782— B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.; Glasg.U.i.; Linn.S.i.; Oxon.B.i.; R.A.S.i.; R.S.; S.K.i.; U.C.L.i.
- Rochester (N. Y.) Ac. Sc. P.** ..... See **Mod. Mm. S., Verona Mm. S. It. and Verona S. It. Mm.**  
Proceedings of the Rochester Academy of Sciences. Rochester, N.Y.  
1890— B.M.; Camb.P.S.; Edinb.R.S.i.; Linn.S.; N.H.M.; R.S.; U.C.L.i.
- Rot. N. Vh.** ..... *Nieuwe Verhandelingen van het Bataafsch Genootschap der Proefondervindelijke Wijsbegeerte te Rotterdam.* Rotterdam.  
1800— B.M.i.; Camb.U.i.; Chem.S.i.; Dub.R.D.S.; Edinb.R.S.i.; Glasg.U.i.; Oxon.B.; R.S.
- Rouen Ac. Tr.** ..... *Précis analytique des Travaux de l'Académie des Sciences, Belles-Lettres, et Arts de Rouen.* Rouen.  
1804— B.M.; Camb.U.; Dub.R.I.A.; Dub.T.C.; N.H.M.i.; Oxon.B.; R.S.i.
- Rouen Bil. S. Ém.** ..... See **Rouen Tr. Ac.**  
*Bulletins [des travaux] de la Société Libre d'Émulation de Rouen.* Rouen.  
1837— B.M.; Oxon.B.
- Rouen Tr. Ac.** ..... See **Rouen Ac. Tr.**
- Roum. I. Mét. A.** ..... *Annales de l'Institut Météorologique de Roumanie.* Bucarest, Paris.  
1886— B.M.; Edinb.R.S.; R.Geogr.S.i.
- Rpm. Anal. C.** ..... *Repertorium der Analytischen Chemie für Handel, Gewerbe und Öffentliche Gesundheitspflege.* Hamburg, Leipzig.  
1881—87. *Continued as:* Zeitschrift für die Chemische Industrie, 1887. Chem.S.; P.O.
- Rpm. Mth.** ..... *Repertorium der literarischen Arbeiten aus dem Gebiete der reinen und angewandten Mathematik.* Leipzig.  
1877—79. Camb.U.; R.S.
- Rpm. Phm.** ..... *Repertorium für die Pharmacie; Gehlen.* Nürnberg.  
1815—51. B.M.; Camb.U.; Pharm.S.; R.S.
- Rpm. Ps.** ..... *Repertorium der Physik. Enthaltend eine vollständige Zusammenstellung der neuern Fortschritte dieser Wissenschaft.* Berlin.  
1837—49. Chem.S.; Glasg.P.S.i.; P.O.; R.S.; S.K.; U.C.L.
- Rs. An. Mines** ..... *Annuaire du Journal des Mines de Russie.* St. Pétersbourg.  
1835—42. B.M.; Geol.S.; Glasg.U.i.; I.CE.; N.H.M.i.; Oxon.B.; P.O.; R.S.i.; S.K.; U.C.L.i.
- R. School Nv. Archt. An.** ..... *The Annual of the Royal School of Naval Architecture and Marine Engineering.* London.  
1871—74. Camb.U.i.; I.CE.i.; Oxon.B.i.; P.O.; R.S.; S.K.i.
- Rs. C. Ps. S. J.** ..... *Journal of the Russian Chemical Society and of the Physical Society of the Imperial University of St. Petersburg.* [In Russian.] St. Petersburg.  
1873—78. *Continuation of:* Journal of the Russian Chemical Society, 1869—72. *Continued as:* Journal of the Russian Physico-Chemical Society, etc., 1879— Camb.P.S.i.; Chem.S.; Edinb.R.S.i.; N.H.M.
- R. S. P.** ..... *Proceedings of the Royal Society of London.* London.  
1832— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.; Dub.R.D.S.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.; Edinb.U.; Geol.M.; Geol.S.; Glasg.P.S.; Glasg.U.i.; I.CE.; Linn.S.i.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; Pharm.S.i.; P.O.; R.A.S.; R.Geogr.S.; R.S.; S.K.; U.C.L.
- Rs. Ps.-C. S. J.** ..... *Journal of the Russian Physico-Chemical Society of the Imperial University of St Petersburg.* [In Russian.] St Petersburg.  
1879— *Continuation of:* Journal of the Russian Chemical Society, etc., 1869—78. Camb.P.S.i.; Chem.S.; Edinb.R.S.i.; N.H.M.
- R. S. Yearbook** ..... *Yearbook of the Royal Society of London.* (Biography 1900.)
- Rugby NH. S. Rp.** ..... *Reports of the Rugby School Natural History Society.* Rugby.  
1867— Geol.S.; N.H.M.; S.K.i.
- Rv. Artl.** ..... *Revue d'Artillerie.* Paris, Nancy.  
1872— B.M.; I.CE.; P.O.
- Rv. Brazil.** ..... *Revista Brasileira, Jornal de Ciencias, Lettras, e Artes; Oliveira.* Rio de Janeiro.  
1857—61. B.M.; N.H.M.; R.S.i.

## List of Serial Publications

- Rv. Cours. Sc.** ..... Revue des Cours Scientifiques de la France et de l'Étranger; Eug. Yung et Em. Alglave. Paris.  
1863—70. B.M.; Edinb.R.S.i.; Edinb.U.; N.H.M.; Oxon.R.; P.O.; R.S.; S.K.
- Rv. Mar.** ..... { Revue maritime et coloniale. Paris.  
1861— B.M.; I.CE.i.; Oxon.B.; Oxon.R.; P.O.; R.Geogr.S.i.
- Rv. Mar. et Col.** ..... {
- Rv. Minera** ..... Revista Minera, periódico científico é industrial; red. por una Sociedad de Ingenieros. Madrid.  
1850— B.M.; I.CE.i.; P.O.
- Rv. Mn. Cr.** ..... Rivista di Mineralogia e Cristallografia Italiana. Padova.  
1887— B.M.; Camb.U.; Geol.M.; Geol.S.; N.H.M.; S.K.
- Rv. Mt.** ..... Rivista di Matematica. Torino.  
1891—95. *Continued as:* Revue de Mathématiques, 1896— Camb.U.; Oxon.B.; R.S.
- Rv. Mth.** ..... Revue de Mathématiques. Turin.  
1896— *Continuation of:* Rivista di Matematica, 1891—95. Camb.U.; Oxon.B.; Oxon.R.; R.S.
- Rv. Quest. Sc.** ..... Revue des Questions Scientifiques, publiée par la Société Scientifique de Bruxelles. Louvain, Paris.  
1877— B.M.; N.H.M.; S.K.i.
- Rv. Sc.** ..... Revue scientifique et industrielle; Quesneville. Paris.  
1840—52. B.M.; Camb.U.; Chem.S.i.; Oxon.B.i.; S.K.
- Rv. Sc.** ..... La Revue Scientifique de la France et de l'Étranger. Paris.  
1871— B.M.; Camb.U.; Edinb.R.S.; Edinb.U.; Geol.S.; N.H.M.; Oxon.R.; P.O.; R.A.S.i.; R.S.; S.K.
- Rv. Sc.-Ind.** ..... Rivista Scientifico-Industriale delle principali scoperte ed invenzioni fatte nelle scienze e nelle industrie. Firenze.  
1869— P.O.
- Rv. Sper. Freniatr.** ..... Rivista Sperimentale di Freniatria e di Medicina legale. Reggio-Emilia.  
1875— Coll.Surg.
- Rv. Un. Mines** ..... Revue Universelle des Mines, de la Métallurgie, etc.; de Cuyper. Paris, Liège.  
1857— B.M.; Camb.U.; Dub.R.I.A.i.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.; N.H.M.; P.O.; S.K.  
*See Cuyper Rv. Un.*
- Sächs. Ing. Vr. Mt.** ..... Mittheilungen des Sächsischen Ingenieur-Vereins. Dresden.  
1858—60. I.CE.; P.O.
- S. Afr. Ph. S. T.** ..... The Transactions of the South African Philosophical Society. Cape Town.  
1878— B.M.; Camb.P.S.; Camb.U.i.; Chem.S.; Edinb.R.S.; Edinb.U.; Glasg.P.S.; I.CE.i.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.
- Santiago de Chile Un. A.** ..... Anales de la Universidad de Chile. Santiago de Chile.  
1843— B.M.i.; Dub.T.C.; Glasg.U.i.; N.H.M.i.; Oxon.B.i.; R.Geogr.S.i.  
*See Chile A. Un.*
- S. Aust. R. S. T.** ..... Transactions and Proceedings and Report of the Royal Society of South Australia. Adelaide.  
1879— Camb.P.S.i.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.; I.CE.i.; Linn.S.i.; N.H.M.; P.O.; R.A.S.; R.Geogr.S.i.; R.S.i.
- Sav. Ac. Mm.** ..... { Mémoires de la Société Académique de Savoie. Chambéry.  
1825— Camb.U.; Dub.R.I.A.; Dub.T.C.; N.H.M.; Oxon.B.; R.S.i.
- Sav. Mm. Ac.** ..... { *See Chambéry Mm. Ac. Sav.*
- Sav. S. H. Nt. Bil.** ..... Bulletin de la Société d'Histoire Naturelle de Savoie. Chambéry.  
1850—53; 1887— Geol.S.i.; N.H.M.
- Sav. S. H. Nt. C.R.** ..... Comptes-Rendus des Séances de la Société d'Histoire Naturelle de Savoie à Chambéry. Annecy.  
1883—86. *Continued as:* Bulletin de la Société, etc. 1887— Geol.S.i.; N.H.M.
- Sc. Abs.** ..... Science Abstracts. Physics and Electrical Engineering. London.  
1898— Camb.P.S.; Camb.U.; Chem.S.; Edinb.R.S.i.; Edinb.U.; Glasg.P.S.; I.CE.; Oxon.R.; P.O.; R.A.S.i.; R.S.; S.K.; U.C.L.
- Schelling Z. Spec. Ps.** ... Zeitschr. für speculative Physik; Schelling. Jena, Leipzig.  
1800—01. B.M.; Camb.U.; Oxon.B.; R.S.

## List of Serial Publications

- Sch. Gs. N. D.** ..... Neue Denkschriften der allgemeinen Schweizerischen Gesellschaft für die gesammten Naturwissenschaften. Neuchâtel, Zürich, etc. 1837— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.i.; Linn.S.i.; N.H.M.; Oxon.B.; R.S.; S.K.  
See **Zür. N. D. Sch. Gs.**
- Sch. Gs. Vh.** ..... Verhandlungen der Schweizerischen Gesellschaft für die gesammten Naturwissenschaften. Aarau, etc. 1823— B.M.i.; Edinb.R.S.i.; Geol.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.; R.S.; S.K.  
See **Act. S. Helv., At. S. Elvet. and Sch. Nf. Gs. Vh.**
- Schl.-Holst. Nt. Vr. Schr.** ..... Schriften des Naturwissenschaftlichen Vereins für Schleswig-Holstein. Kiel. 1873— B.M.; Camb.U.; Edinb.R.S.i.; Linn.S.; N.H.M.; R.S.i.
- Schlömilch Z.** ..... Zeitschrift für Mathematik und Physik; Schlömilch. Leipzig. 1856— B.M.; Camb.U.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.U.; Glasg.U.i.; Math.S.i.; Oxon.B.(R.); R.S.; S.K.; U.C.L.i.  
See **Z. Mth. Ps.**
- Sch. Mines Q. N. Y.** ..... The School of Mines Quarterly. New York. 1879— B.M.i.; Glasg.P.S.; I.CE.i.; N.H.M.; P.O.; S.K.i.
- Sch. Nf. Gs. Vh.** ..... See **Act. S. Helv., At. S. Elvet. and Sch. Gs. Vh.**
- Sch. Pol. Z.** ..... Schweizerische polytechnische Zeitschrift; Bolley. Winterthur. 1856—70. B.M.; I.CE.; P.O.; R.Geogr.S.i.
- Schumacher Jb.** ..... Jahrbuch (astronomisches); Schumacher. Stuttgart, Tübingen. 1836—44. Camb.U.; Edinb.R.S.i.; Oxon.R.i.; R.A.S.; R.S.i.; U.C.L.
- Schwäb. Gs. D.** ..... Denkschriften der Schwäbischen Gesellschaft der Aerzte und Naturforscher. Tübingen. 1805. N.H.M.; R.S.; S.K.
- Schweigger J.** ..... Journal für Chemie und Physik; Schweigger. Nürnberg. 1811—29. Edinb.R.S.; N.H.M.; Oxon.R.; P.O.; S.K. *Continued as:* Neues Jahrbuch der Chemie und Physik; Schweigger-Seidel. Berlin. 1831—33. B.M.; Chem.S.; Edinb.R.S.; N.H.M.; Oxon.R.; P.O.; R.S.; S.K.
- Science** ..... Science. Cambridge, Mass., and New York. 1883— B.M.; Dub.N.L.I.i.; Dub.R.C.S.i.; Edinb.R.S.; Edinb.U.i.; Geol.S.i.; Glasg.P.S.i.; I.CE.i.; N.H.M.; Oxon.R.i.; P.O.; R.A.S.i.; R.Geogr.S.; S.K.
- S. C. In. J.** ..... The Journal of the Society of Chemical Industry. Manchester, London. 1882— Camb.U.; Chem.S.; Dub.N.L.I.; Dub.R.C.S.; Dub.R.D.S.; Edinb.R.S.i.; Geol.M.i.; Glasg.U.i.; I.CE.; Oxon.R.i.; Pharm.S.; P.O.; R.S.; S.K.; U.C.L.
- Sc. S. Arts T.** ..... Transactions of the Royal Scottish Society of Arts. Edinburgh. 1841— B.M.i.; Camb.U.; Dub.R.D.S.; Edinb.R.S.; Edinb.U.; Glasg.P.S.; Glasg.U.; I.CE.; P.O.; R.S.; S.K.  
See **Edinb. Sc. S. Arts P. and Edinb. T. Sc. S. Arts.**
- Seine-et-Oise Mm.** ..... Mémoires de la Société des Sciences Naturelles de Seine et Oise. Versailles. 1835— B.M.; Camb.U.i.; N.H.M.; S.K.
- Seism. J. Jap.** ..... Seismological Journal of Japan. Yokohama. 1893—95. *Continuation of:* Transactions of the Seismological Society of Japan, 1880—92. B.M.; Camb.U.i.; Dub.R.I.A.; Geol.M.; Geol.S.; I.CE.; R.A.S.i.; R.Geogr.S.; R.S.
- Senckb. Nf. Gs. B.** ..... Bericht ueber die Senckenbergische Naturforschende Gesellschaft in Frankfurt am Main. Frankfurt a. M. 1868— B.M.; Camb.U.i.; Geol.S.i.; Linn.S.; N.H.M.; R.S.
- Sid. Mess.** ..... The Sidereal Messenger. Northfield, Minn. 1883—91. *Continued as:* Astronomy and Astrophysics, 1892—94. B.M.; R.A.S.; S.K.i.
- Siena At. Ac.** ..... Atti dell' Accademia delle Scienze di Siena detta de' Fisio-critici. Siena. 1761— B.M.; Camb.U.i.; Dub.R.I.A.i.; Dub.T.C.i.; N.H.M.i.; Oxon.B.; R.S.i.
- Silliman J.** ..... The American Journal of Science and Arts; Silliman. New Haven. 1818— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.N.L.I.i.; Dub.R.C.S.i.; Dub.T.C.i.; Edinb.R.S.; Edinb.U.; Geol.M.;

## List of Serial Publications

- Geol.S.; Glasg.P.S.; Glasg.U.i.; I.CE.i.; N.H.M.; Oxon.B.; Oxon.R.; P.O.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.
- See Am. J. Sc.*
- Sk. Nf. F.** ..... Förhandlingar vid det af Skandinaviska Naturforskare och Läkare hållna Môte..... Götteborg, etc.
- Sk. Nt. Mød. F.** ..... 1839— Oxon.B.i.; R.S.i.
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- Stockh. Ak. Hndl.** ..... 1739— B.M.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.i.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.i.; Linn.S.i.; N.H.M.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.
- Stockh. Ak. Hndl. Bh.** ... Bihang till Kongl. Svenska Vetenskaps-Akademiens Handlingar. Stockholm.
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1860— B.M.i.; Camb.P.S.; Camb.U.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; Glasg.P.S.i.; Glasg.U.; Linn.S.i.; N.H.M.; Oxon.B.; Oxon.R.i.; P.O.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.  
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- St. Pét. Bll. Ac. Sc.** ..... *See St. Pét. Ac. Sc. Bll.*
- St. Pét. Bll. Sc.** ..... *See St. Pét. Ac. Mm. and St. Pét. Ac. Sc. Mm.*
- St. Pét. Mm.** ..... *See St. Pét. Ac. Mm. and St. Pét. Ac. Sc. Mm.*
- St. Pét. Mm. Ac. Sc.** ..... *See St. Pét. Ac. Mm. and St. Pét. Ac. Sc. Mm.*
- St. Pét. Mm. Sav. Etr.** ... Mémoires présentés à l'Académie Impériale des Sciences de St. Pétersbourg par divers Savans. St. Pétersbourg.  
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P.O.i.; R.A.S.; R.S.; S.K.; U.C.L.i.

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[In the references to this serial two sets of paging are sometimes given; the first refers to the volumes containing the Classe di Scienze Fisiche, Matematiche e Naturali only, the second to the volumes containing all the sections. When only one paging is given, it refers to the fuller series.]

**Tor. Ac. Sc. Mm.** ..... See **Tor. Ac. Mm.**, **Tor. Mm. Ac.**, and **Turin Ac. Mm.**

**Tor. At. Ac. Sc.** ..... See **Tor. Ac. Sc. At.**

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**Turin Mm. Ac.** ..... } 1784—1816. B.M.; Dub.R.I.A.i.; Edinb.R.S.; Glasg.U.i.; Linn.S.; Oxon.B.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.

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- Ups. Läk. F.** ..... Upsala Läkareförenings Förhandlingar. Upsala.  
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- Ups. N. Acta S. Sc.** ..... Nova Acta Regiæ Societatis Scientiarum Upsaliensis. Upsalia.  
**Ups. S. Sc. N. Acta** ..... 1773— B.M.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.i.; Glasg.U.i.;  
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States Department of Agriculture, 1894— B.M.; Camb.P.S.i.;  
Camb.U.i.; Dub.N.L.I.; Dub.R.I.A.; Glasg.P.S.i.; Glasg.U.i.;  
I.CE.i.; N.H.M.; P.O.; R.Geogr.S.i.; R.S.i.; S.K.i.; U.C.L.i.
- Utr. A. Ac.** ..... Annales Academiæ Rheno-Trajectinæ. Trajecti ad Rhenum.  
(Utrecht.)  
1815—37. B.M.; Camb.U.i.; Glasg.U.i.; N.H.M.; Oxon.B.;  
Oxon.R.i.; R.S.i.; S.K.i.
- Utr. Aant. Prv. Gn.** ..... Aanteekeningen van het Verhandelde in de Sectie-Vergaderingen  
van het Provinciaal Utrechtsch Genootschap van Kunsten en  
Wetenschappen. Utrecht.  
1846— Dub.R.D.S.; Edinb.R.S.; R.S.  
*See Utr. Prv. Gn. Aant.*
- Utr. N. Vh.** ..... Nieuwe Verhandeligen van het Provinciaal Utrechtsche Genootschap  
van Kunsten en Wetenschappen. Utrecht.  
1822—69. *Continuation of:* Verhandeligen, etc., 1781—1821.  
B.M.; Camb.U.i.; Dub.R.D.S.; Oxon.B.; R.S.i.
- Utr. Prv. Gn. Aant.** ..... *See Utr. Aant. Prv. Gn.*
- Utr. Vh. Prv. Gn.** ..... Verhandeligen van het Provinciaal Utrechtsch Genootschap van  
Kunsten en Wetenschappen. Utrecht.  
1781—1821. *Continued as:* Nieuwe Verhandeligen, etc., 1822—69.  
B.M.; Camb.U.; Dub.R.D.S.; Edinb.R.S.i.; Oxon.B.; R.S.i.
- Valenciennes Mm.** ..... Mémoires de la Société d'Agriculture, des Sciences, et des Arts de  
l'arrondissement de Valenciennes. Valenciennes.  
**Valenciennes Mm. S. Ag.** ..... 1833—53. B.M.; Oxon.B.i.; R.S.i.
- Vars. S. Nt. Tr. (C. R.,  
Ps. C.)** ..... Travaux de la Société des Naturalistes de Varsovie. Comptes  
Rendus de la Section de physique et de chimie. Varsovie. [In  
Russian.]  
1889— Math.S.; N.H.M.



## List of Serial Publications

- V. Diem. R. S. Pp.** ..... Papers and Proceedings of the Royal Society of Van Diemen's Land.  
Hobart Town.  
1851—59. B.M.i.; Camb.P.S.i.; Dub.R.D.S.; Edinb.R.S.i.; Geol.S.;  
I.CE.i.; N.H.M.i.; R.A.S.i.; R.Geogr.S.i.; R.S.; S.K.
- Ven. At.** ..... Atti delle Adunanze dell' I. R. Istituto Veneto di Scienze, Lettere,  
ed Arti. Venezia.  
1841— B.M.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.i.; Linn.S.i.;  
R.S.i.
- Ven. Aten.** ..... L'Ateneo Veneto: Rivistamensile di Scienze, Lettere ed Arti. Venezia.  
1881?— Dub.R.D.S.i.; R.S.i.
- Ven. Aten. At.** ..... Atti dell' Ateneo Veneto. Venezia.  
1864— Dub.R.D.S.; R.S.i.
- Ven. Aten. Esercit.** ..... Esercitazioni Scientifiche e Letterarie dell' Ateneo di Venezia.  
Venezia.  
1837—60. B.M.i.; Dub.T.C.i.; Oxon. B.i.; R.S.i.  
*See Ven. Esercit. Aten.*
- Ven. At. I.** ..... Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti. Venezia.  
1841— B.M.; Edinb.R.S.i.; I.CE.i.; Linn.S.i.; Math.S.i.; N.H.M.;  
R.S.i.  
*See Ven. I. At.*
- Ven. Esercit. Aten.** ..... *See Ven. Aten. Esercit.*
- Ven. I. At.** ..... *See Ven. At. I.*
- Ven. I. Mm.** ..... Memorie del Reale Istituto Veneto di Scienze, Lettere, ed Arti.  
Venezia.
- Ven. Mm. I.** ..... 1843— B.M.; Camb.U.; Dub.R.I.A.i.; Linn.S.i.; N.H.M.;  
Oxon.B.i.; R.S.; S.K.
- Verona Mm. S. It.** ..... Memorie di Matematica e di Fisica della Società Italiana delle  
Scienze. Modena e Verona.
- Verona S. It. Mm.** ..... 1782— B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.i.;  
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*See Mod. Mm. S. and Rm. S. It. Mm.*
- Vict. I. J.** ..... Journal of the Transactions of the Victoria Institute, or Philosophical  
Society of Great Britain. London.  
1867— B.M.; Camb.U.; Dub.R.D.S.; Dub.T.C.; Geol.M.i.; Geol.S.;  
N.H.M.; Oxon.B.; P.O.; R.Geogr.S.i.; R.S.i.; S.K.
- Vict. Ph. S. T.** ..... Transactions of the Philosophical Society of Victoria. Melbourne.  
1855. *Continued as:* Transactions of the Philosophical Institute,  
etc., 1855—60. B.M.; Edinb.R.S.; Geol.S.; Linn.S.; N.H.M.;  
R.A.S.; R.Geogr.S.; R.S.; S.K.
- Vict. R. S. P.** ..... Proceedings of the Royal Society of Victoria. Melbourne.  
1889— B.M.; Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.  
R.S.; Edinb.U.; Geol.S.; Glasg.P.S.; Glasg.U.; I.CE.i.; N.H.M.;  
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- Vict. R. S. T.** ..... Transactions and Proceedings of the Royal Society of Victoria.  
Melbourne.  
1861— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.; Dub.R.I.A.;  
Edinb.R.S.; Edinb.U.; Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.i.;  
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- Vict. T. Ph. I.** ..... Transactions of the Philosophical Institute (afterwards Royal Society)  
of Victoria. Melbourne.  
1855—60. *Continuation of:* Transactions of the Philosophical  
Society, 1855. B.M.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.;  
Geol.S.; Glasg.P.S.i.; Glasg.U.i.; I.CE.; Linn.S.; N.H.M.;  
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- Vict. T. Ph. S.** ..... *See Vict. Ph. S. T.*
- Vict. T. R. S.** ..... *See Vict. R. S. T.*
- V. Nost. Eng. Mg.** ..... Van Nostrand's Engineering Magazine. New York.  
1869—85. *Continued as:* The Railroad and Engineering Journal,  
1887—92. B.M.; I.CE.i.; P.O.; R.S.i.
- Voigt Mg.** ..... Magazin für den neuesten Zustand der Naturkunden, mit Rücksicht  
auf die dazu gehörigen Hülfswissenschaften; Voigt. Jena und  
Weimar.  
1797—1806. B.M.; Camb.U.; N.H.M.; R.S.
- Vosg. S. Ém. A.** ..... Annales de la Société d'Émulation du Département des Vosges.  
Épinal, Paris.  
1831— B.M.; R.S.i.

## List of Serial Publications

- Walker Electr. Mg.** ..... The Electrical Magazine; Walker. London, Paris.  
1845—46. B.M.; Camb.U.; Glasg.P.S.i.; I.CE.; Oxon.B.; P.O.; R.S.
- Wash. Mm. Nat. Ac.** ... {Memoirs of the National Academy of Sciences. Washington.  
1866— B.M.i.; Camb.P.S.; Camb.U.i.; Dub.R.I.A.; Edinb.R.S.;  
**Wash. Nat. Ac. Mm.**..... {Glasg.U.i.; Math.S.i.; N.H.M.; Oxon.B.i.; Oxon.R.; P.O.; R.S.;  
S.K.; U.C.L.i.
- Wash. Ph. S. Bll.** ..... Bulletin of the Philosophical Society of Washington. Washington.  
1874— B.M.; Camb.P.S.; Edinb.R.S.; Geol.S.; Glasg.U.i.; Linn.S.;  
N.H.M.; Oxon.B.; P.O.; R.A.S.; R.S.; S.K.i.
- Weale Q. Pp.** ..... Quarterly Papers on Engineering; Weale. London.  
1843—49. B.M.; I.CE.; Oxon.B.; P.O.
- Westf. Vr. Jbr.** ..... Jahres-Bericht des Westfälischen Provinzialvereins für Wissenschaft  
und Kunst. Münster.  
1873— N.H.M.
- Wet. Gs. Nt. B.** ..... Bericht der Wetterauischen Gesellschaft für die gesammte Natur-  
kunde zu Hanau. Hanau.  
1843— Dub.R.I.A.i.; Geol.S.i.; R.S.i.
- Wetter** ..... Das Wetter. Meteorologische Monatsschrift für Gebildete aller  
Stände. Magdeburg, Braunschweig, Berlin.  
1885— B.M.
- Wiad. Mt.**..... Wiadomości Matematyczne. Warsaw.  
1897— Camb.P.S.; Math.S.
- Wien Ak. D.**..... Denkschriften der Kaiserlichen Akademie der Wissenschaften.  
Mathematisch-Naturwissenschaftliche Classe. Wien.  
1850— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.R.I.A.;  
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- Wien Ak. Sb.** ..... *See* **Wien D.**  
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der Kaiserlichen Akademie der Wissenschaften. Wien.  
1848— B.M.; Camb.P.S.i.; Camb.U.; Chem.S.i.; Dub.R.I.A.;  
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- Wien Alm.** ..... *See* **Wien SB. and Wien Sb.**  
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1851— B.M.; Camb.P.S.i.; Camb.U.; Dub.R.I.A.i.; Edinb.R.S.i.;  
Glasg.U.i.; Oxon.B.; P.O.i.; R.A.S.i.; R.S.i.; S.K.i.; U.C.L.i.
- Wien Az.** ..... Anzeiger der Kaiserlichen Akademie der Wissenschaften; Math-  
Naturwiss. Classe. Wien.  
1864— Camb.U.; Geol.S.i.; Linn.S.; N.H.M.; Oxon.B.; Pharm.  
S.i.; R.S.i.
- Wien Berg-Hm. Jb.** ..... Berg- und Hüttenmännisches Jahrbuch der k. k. Schemnitzer-  
Bergakademie und der k. k. Montan-Lehranstalten zu Leoben  
und Příbram. Wien.  
1851— B.M.i.; Geol.S.i.; I.CE.i.; P.O.i.; S.K.
- Wien D.**..... *See* **Berg-Hm. Jb., Jb. Berg-Hm., and Leoben Berg-Hm. Jb.**
- Wien Gg. Gs. Mt.** ..... *See* **Wien Ak. D.**  
Mittheilungen der k. k. Geographischen Gesellschaft. Wien.  
1857— B.M.; Dub.R.I.A.i.; Dub.T.C.i.; N.H.M.; Oxon.B.;  
R.Geogr.S.; R.S.; S.K.i.
- Wien Gl. Jb.**..... *See* **Wien Mt. Gg. Gs.**
- Wien Jb. Gl.** ..... {Jahrbuch der k.k. Geologischen Reichsanstalt. Wien.  
1850— Camb.P.S.; Camb.U.; Dub.R.I.A.; Dub.T.C.; Edinb.R.S.;  
Geol.M.; Geol.S.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; P.O.;  
R.Geogr.S.i.; R.S.; U.C.L.i.
- Wien Jb. Pol. I.** ..... Jahrbuch des k. k. Polytechnischen Instituts in Wien; Prechtl.  
Wien.  
1819—39. B.M.; Camb.U.; Oxon.B.; P.O.
- Wien Jbr. Ober-Realsch.** ..... Jahresbericht der öffentlichen Ober-Realschule in der innern Stadt.  
Inn. Stadt ..... Wien.  
1859—63.
- Wien Met. Z.** ..... Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie.  
Wien.  
1866—85. *Continued in:* Meteorologische Zeitschrift, 1886—  
Camb.U.; Dub.R.D.S.; Edinb.R.S.; P.O.; R.Geogr.S.; R.S.
- Wien Mt. Gg. Gs.** ..... *See* **Wien Gg. Gs. Mt.**

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<b>Wien Pht. Cor.</b> .....	Photographische Correspondenz. Organ der Photograph. Gesellsch. in Wien. Wien. 1865— P.O.
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<b>Wien Sb.</b> .....	
<b>Wien Vr. Nw. Kennt. Schr.</b> .....	
<b>Wisc. Ac. T.</b> .....	Schriften des Vereins zur Verbreitung Naturwissenschaftlicher Kenntnisse in Wien. 1860— B.M.i.; Camb.U.i.; N.H.M.i.; P.O.; R.S.i.
	Transactions of the Wisconsin Academy of Sciences, Arts and Letters. Madison. 1872— B.M.; Camb.P.S.; Dub.R.I.A.; Edinb.R.S.; Geol.S.i.; N.H.M.; Oxon.R.i.; P.O.i.; R.S.; S.K.i.; U.C.L.i.
<b>Woolh. FC. T.</b> .....	Transactions of the Woolhope Naturalists' Field Club. Hereford. 1866— B.M.; Camb.U.i.; Dub.T.C.i.; Geol.M.i.; Geol.S.; Linn.S.i.; N.H.M.i.; Oxon.B.; U.C.L.i.
<b>Woolw. P.</b> .....	Minutes of Proceedings of the Royal Artillery Institution. Woolwich. 1858— B.M.; Camb.U.i.; I.CE.; P.O.; R.Geogr.S.i.
<b>Würtb. Ab.</b> .....	Naturwissenschaftliche Abhandlungen, herausgegeben von einer Gesellschaft in Württemberg. Tübingen. 1826—28. B.M.; N.H.M.; R.S.
<b>Würtb. Jh.</b> .....	Jahreshefte des Vereins für vaterländische Naturkunde in Württemberg. Stuttgart. 1845— B.M.; Camb.U.; Dub.R.D.S.i.; Dub.T.C.i.; Geol.S.; Linn.S.; N.H.M.; R.S.; S.K.
<b>Würzb. Jb. Ph. Md. Gs.</b> .....	Jahrbücher der Philosophisch-Medicinischen Gesellschaft zu Würzburg. Würzburg. 1828. Dub.R.I.A.; R.S.; U.C.L.
<b>Würzb. Nw. Z.</b> .....	Würzburger Naturwissenschaftliche Zeitschrift; herausgegeben von der Physikalisch-Medicinischen Gesellschaft. Würzburg. 1860—67. Camb.U.; Geol.S.i.; Linn.S.; N.H.M.; S.K.
<b>Würzb. Vh.</b> .....	Verhandlungen der Physikalisch-Medicinischen Gesellschaft. Würzburg. 1850—60. 1868— <i>Continued as:</i> Würzburger Naturwissenschaftliche Zeitschrift, 1860—67. B.M.i.; Camb.P.S.i.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Linn.S.; N.H.M.; Oxon.R.; R.S.; S.K.i.; U.C.L.i.
<b>W. Yorks. Gl. S. P.</b> .....	Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. Leeds. 1839— B.M.i.; Camb.U.i.; Dub.R.D.S.; Edinb.R.S.i.; Geol.M.; Geol.S.i.; N.H.M.i.; Oxon.R.; P.O.i.; R.S.i.; U.C.L.i.
<b>W. Yorks. P. Gl. S.</b> .....	
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<b>Zach Cor.</b> .....	Correspondance Astronomique, Géographique, Hydrographique, et Statistique; von Zach. Gènes. 1818—26. B.M.; R.A.S.; R.S.
<b>Zach M. Cor.</b> .....	Monatliche Correspondenz zur Beförderung der Erd- und Himmelskunde; von Zach. Gotha. 1800—13. Oxon.B.; R.A.S.; R.S.; U.C.L.
<b>Z. Angew. C.</b> .....	Zeitschrift für Angewandte Chemie. Berlin. 1888— <i>Continuation of:</i> Zeitschrift für die Chemische Industrie, 1887. B.M.; Chem.S.; Glasg.P.S.; Glasg.U.; Oxon.R.i.; P.O.
<b>Z. Anorg. C.</b> .....	Zeitschrift für Anorganische Chemie. Hamburg, Leipzig. 1892— Camb.P.S.; Camb.U.; Chem.S.; Dub.R.C.S.; Glasg.U.; N.H.M.; Oxon.R.i.; Pharm.S.; P.O.; S.K.; U.C.L.
<b>Z. Bauw.</b> .....	Zeitschrift für Bauwesen; herausg. unter Mitwirkung der königl. technischen Bau-Deputation und des Architekten-Vereins zu Berlin. Berlin. 1851— B.M.; Camb.U.i.; I.CE.; P.O.; S.K.i.
<b>Z. Bl.</b> .....	Zeitschrift für Biologie. München. 1865— B.M.; Camb.U.i.; Chem.S.i.; Glasg.U.i.; Oxon.R.; R.S.; U.C.L.
<b>Z. Berg- H.-Salw.</b> .....	Zeitschrift für das Berg-, Hutten-, und Salinenwesen in dem Preussischen Staate. Berlin. 1854— B.M.; I.CE.; P.O.; S.K.
<b>Zeeuw. Gn. N. Vh.</b> .....	Nieuwe Verhandelingen van het Zeeuwsch Genootschap der Wetenschappen. Middelburg. 1807—35. B.M.; Camb.U.i.; N.H.M.; Oxon.B.; R.S.

## List of Serial Publications

- Z. Instk.** ..... Zeitschrift für Instrumentenkunde. Organ für Mittheilungen aus dem gesammten Gebiete der wissenschaftlichen Technik. Berlin. 1881— B.M.; Camb.U.; Chem.S.; Edinb.U.; Oxon.R.; P.O.; R.A.S.; R.S.; S.K.; U.C.L.i.
- Živa** ..... Živa: Časopis přírodnický. Praz. 1853—68. B.M.; Linn.S.i.; N.H.M.
- Z. Kr.** ..... Zeitschrift für Krystallographie und Mineralogie. Leipzig. 1877— B.M.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Edinb.R.S.; Geol.M.; Geol.S.; N.H.M.; Oxon.R.; P.O.; R.S.; S.K.
- Z. Mth. Ps.** ..... Zeitschrift für Mathematik und Physik; Schlömilch. Leipzig. 1856— B.M.; Camb.U.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.U.; Glasg.U.i.; Math.S.i.; Oxon.B.(R.); R.S.; S.K.; U.C.L.i.
- See **Schlömilch Z.**
- Z. Nw.** ..... Zeitschrift für die gesammten Naturwissenschaften; herausgegeben von dem Naturwissenschaftlichen Vereine für Sachsen und Thüringen in Halle; Giebel. Berlin. 1853— B.M.; Camb.U.i.; Dub.N.L.I.i.; Dub.R.D.S.i.; Dub.R.I.A.i.; Dub.T.C.i.; Edinb.R.S.; Linn.S.; N.H.M.; Oxon.B.; Oxon.R.; R.S.; S.K.
- See **Halle Z. and Halle Z. Nw.**
- Z. Ohrh.** ..... Zeitschrift für Ohrenheilkunde. Wiesbaden. 1879— *Continuation of:* Archiv für Augen- und Ohrenheilkunde, 1869—78. B.M.; Camb.U.
- Z. Pl. C.** ..... Zeitschrift für Physiologische Chemie. Strassburg. 1877— Camb.U.; Chem.S.; Dub.N.L.I.i.; Glasg.U.; Oxon.R.; Pharm.S.; P.O.i.; S.K.; U.C.L.
- Z. Ps. C.** ..... Zeitschrift für Physikalische Chemie, Stöchiometrie und Verwandtschaftslehre. Leipzig. 1887— B.M.; Camb.P.S.; Camb.U.; Chem.S.; Dub.N.L.I.i.; Dub.R.C.S.i.; Glasg.U.; N.H.M.; Oxon.R.i.; P.O.i.; R.S.; S.K.; U.C.L.
- Z. Psychol.** ..... Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Hamburg, Leipzig. 1890— B.M.; Camb.U.; Edinb.U.; Glasg.U.; Oxon.B.; Oxon.R.; R.S.; U.C.L.
- Zür. Mt.** ..... Mittheilungen der Naturforschenden Gesellschaft in Zürich. Zürich. 1847—56. Chem.S.i.; Dub.R.I.A.; Edinb.R.S.i.; Linn.S.; N.H.M.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.
- Zür. N. D. Sch. Gs.** ..... Neue Denkschriften der allgemeinen Schweizerischen Gesellschaft für die gesammten Naturwissenschaften. Neuchâtel, Zürich, etc. 1837— B.M.; Camb.P.S.; Camb.U.; Dub.R.D.S.i.; Dub.R.I.A.i.; Edinb.R.S.; Geol.S.i.; Linn.S.; N.H.M.; Oxon.B.; R.S.; S.K.
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- Zür. Nf. Gs. Njbl.** ..... An die Zürcherische Jugend... von der Naturforschenden Gesellschaft. Zürich. 1799—1870. *Continued as:* Neujahrsblatt herausgegeben von der Naturforschenden Gesellschaft in Zürich, 1871— Camb.P.S.; Camb.U.i.; N.H.M.; R.S.
- Zür. Ps. Gs. Jbr.** ..... Jahresbericht der Physikalischen Gesellschaft in Zürich. Uster-Zürich. 1888— R.S.
- Zür. Vjschr.** ..... Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich. Zürich. 1856— B.M.; Camb.P.S.; Camb.U.i.; Chem.S.i.; Dub.R.I.A.; Edinb.R.S.; Linn.S.i.; Math.S.i.; N.H.M.; R.A.S.; R.Geogr.S.i.; R.S.; S.K.
- Zwick. Vr. Nt. Jbr.** ..... Jahresbericht des Vereins für Naturkunde zu Zwickau. Zwickau. 1874— N.H.M.; R.S.i.
- Z. Zuckin. Böhm.** ..... Zeitschrift für Zuckerindustrie in Böhmen. Prag. 1876— Chem.S.; P.O.i.



# MECHANICS

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— — —, Manby's. *Dillon, T.* Dubl. R. S. J. 2 (1858-59) 231-.

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—, utility. *Morogues, (le Baron de).* [1831] Par. Mm. Sav. Étr. 5 (1838) 152-.

— — — (de Morogues). *Girard, P. S.* Par. Mm. Ac. Sc. 13 (1835) 189-.

— — — or otherwise to state. *Tydemann, H. W.* Haarl. Ntk. Vh. Mtsch. 10 (1820) 1-.

Metallurgical and mechanical progress as illustrated in the Manchester Exhibition. *Ashbury, T. I. & S. I. J.* (1887) (No. 2) 22-.

Micrometer gauge, Haines, for measuring thickness of iron or steel during rolling. *Haines, R. B. (jun.)* Franklin I. J. 135 (1893) 42-.

Microscopes, universal screw for. *Beck, R.* Mer. S. T. 7 (1859) 92-; J. Mer. Sc. 8 (1860) 103-.

Mining appliances, Mexico, before 1825. *Berghes, M. de.* Karsten Arch. 21 (1847) 293-.

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Pig iron, world's production, and distribution. *Birkinbine, J.* [1900] Am. I. Mn. E. T. 30 (1901) 504-.

Pleurometer, for measuring trees and buildings. *Mondot de Lagorce, —.* Lyon S. Ag. A. 4 (1841) 481-.

Press, Imperial, Vienna, polygraphic apparatus in. *Auer, A.* Wien SB. 9 (1852) 868-.

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Public works, ancient and modern. *Hawshaw, (Sir) J. B. A. Rp.* (1875) lxviii-.

Salvage operations, wreck of "Thetis" off C. Frio. *De Roos, F. T. R. S. P.* 3 (1834) 266-.

Shipbuilding materials, progress in. *White, W. H. I. & S. I. J.* (1891) (No. 2) 42-.

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—, sailing-, auxiliary steam power for. *Seaward, S.* CE. I. T. 3 (1842) 385-.

—, speed, economical. *Canter, W. J.* (vii) R. School Nv. Archt. An. (1874) No. 4, 46-.

—, steam-, cargo-, most profitable speed for. *Napier, J. R.* Glasg. Ph. S. P. 6 (1865) 33-.

— — —, coal for. *De la Beche, (Sir) H. T., & Playfair, L.* Gl. Sv. Mm. 2 (1848) 539-.

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- Spades for cutting peat. *Gillet de Laumont*, *F. P. N. J. Mines* 32 (1812) 260-.
- Statistics, analysis. *Hale, A. W.* *Am. I. Mn.* E. T. 9 (\*1881) 608-.
- , graphic. *Cheysson, E.* *Gén. Civ.* 9 (1886) 263-; 10 (1886-87) 206-, 224-.
- Steam engine for peat cutting. *Blanken, A.* *Rot. N. Vh.* 6 (1810) 1-.
- in Peruvian mines. *Boase, H. S.* *Cornwall Gl. S. T.* 1 (1818) 212-.
- practice in United States, 1884. *Hoadley, J. C.* *B. A. Rp.* (1884) 886-.
- in Silesian mines. *Aubuisson de Voisins, J. F. d'.* *J. Mines* 14 (1803) 37-.
- machinery in Neuchâtel, etc. *Isely, J. P.* *Neuch. S. Sc. Bll.* 13 (1883) 188-.
- Steel trade in Scotland. *Riley, J. I. & S. I. J.* (1885) 394-.
- Streets of towns, laying out. *Vogt, A. Z. Bl.* 15 (1879) 319-.
- — —, and town-planning. *Badoureau, A.* *Rv. Sc.* 3 (1882) 461-.
- Tariffs, differential, unification. *Courau, J.* [1890] *Gén. Civ.* 18 (1890-91) 6-, 39-.
- Teredo-resisting river works. *Parker, T.* *Aust. As. Rp.* (1895) 753-.

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- Hart, J. H. E.* [Signed "Dharwar."] *Medley I. Eng.* 5 (1868) 369-.
- Automobiles, use in French colonies. *La Valette, H.* *As. Fr. C. R.* (1899) (Pt. 2) 245-.
- Comparison of different modes. *Gerstner, F. J. von.* [1813] *Böhm. Gs. Ab.* 4 (1814) 140 pp.
- — —, application of dynamical principles. *Girard, P. S.* [1824] *Par. Mm. Ac. Sc.* 7 (1827) 433-.
- Ferry steamboats, Dundee. *Hall, B.* *Edinb. Ph. J.* 13 (1825) 146-; *Gill Tech. Rep.* 8 (1826) 70-.
- Formulae. *Jault*, —. (VIII) *A. Cond. Pon. Chauss.* 3 (1859) 383-.
- Heavy loads on ice. *Cram, T. J.* *Franklin I. J.* 16 (1835) 365-.
- — — mountains, proposed system of cylinders and cog-wheels. *Cristoforis, L. de.* *Mil. G. I. Lomb.* 7 (1846) 111-.
- Improvements. *Piobert*, —. *C. R.* 13 (1841) 1079-; 14 (1842) 185-.
- Railway accident, Hugstetten, 1882, Sept. 3. *Ferron, E.* *Lux. I. Pb.* 19 (1883) 209-.
- fares. *Crelle, A. L.* *Crelle J. Bauk.* 14 (1840) 130-.
- , Great Indian Peninsular, Bhoze Ghat incline. *Graham, R. W.* (vi *Adds.*) *Medley Prof. Pp. I. Eng.* 1 (1863-64) 48-.
- trains, speed. *Martin, J.* *As. Fr. C. R.* (1894) (Pt. 2) 304-.
- — —, stopping and starting, expense. *Hyde, E. W.* *V. Nost. Eng. Mg.* 16 (1877) 490-.
- Railways, African, fuel for locomotives on. *Suais*, —. *As. Fr. C. R.* (1899) (Pt. 2) 168-.
- , Australian, unification of gauge. (Annual address before Engin. Sect., Roy. Soc., N. S. W.) *Warren, W. H.* *N. S. W. R. S. J.* 30 (1897) i-.
- Railways, bearing capacity. *Kisfaludi Lipthay, S.* [1892] *Mag. Tud. Ak. Etk. (Mth.)* 15 (1894) No. 1, 38 pp.
- and canals, statistics. *Bonnet*, —. *St. Quant. A.* 3 (1845) 309-.
- , fuel consumption in locomotives. *Henderson, G. R.* *Am. Eng. & Railroad J.* 74 (1900) 186-.
- , inception and progress. *Dudley, P. H.* *N. Y. Ac. T.* 5 (1885-86) 137-.
- , mountain. Cost of working adhesion and toothed wheel lines. *Culmann, K.* *Zür. Vjschr.* 21 (1876) 303-.
- River-bar of the Senegal, improvement of navigation near. *Bouquet de la Grye, J. J. A.* *C. R.* 102 (1886) 1420-.
- Road wear and street traffic. *Dreling, F., & Samans, L.* *Z. Bauw.* 34 (1884) 447-.
- Roads and carriages. *Wingrove, B.* *Tilloch Ph. Mg.* 53 (1819) 8-.
- — —, etc. *Gilbert, D.* *Q. J. Sc.* 18 (1825) 95-.
- — — cost of transport. *Broch, O. J.* *N. Mg. Ntvd.* 6 (1851) 42-.
- , draught of carriages on. *Bevan, B.* (vi *Adds.*) *Ph. Mg.* 7 (1830) 286-.
- , gradients, effects on traffic. *Bokelberg, E.* *Hann. Z. Archt. Vr.* 1 (1855) 60-, 190-.
- , mechanical traction on. *Brabant, G.* *Rv. Un. Mines* 28 (1894) 159-.
- , steam-locomotion on. *Séguier, A. P.* *C. R.* 62 (1866) 1215-; 64 (1867) 950-.
- Shipping statistics, report 1858. *Fairbairn, W. B. A. Rp.* (1858) 239-.
- Ships, propulsion by horse-power and by steam, comparative cost. *Arzberger, J.* *Wien Jb. Pol. I.* 11 (1827) 36-.
- Stone, cost of haulage by waggons. *Morris, E.* *Franklin I. J.* 3 (1842) 79-.
- Tramways, steam. *Cramp, C. C.* [1874] *Eng. S. T.* (1875) 119-.
- Wire-rope transport and haulage, various systems. *Schmidhammer, J.* *Oestr. Z. Brgw.* 23 (1875) 193-, 203-, 213-.

## 0070 Nomenclature.

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- Gilbert, D.* *Phil Trans.* (1827) 25-.
- Wright, T. W.* [1891] *N. Y. Mth. S. Bll.* 1 (1892) 46-.
- Muirhead, R. F.* *Edinb. Mth. S. P.* 13 (1895) 143.
- Acceleration. *Geoghegan, E.* *Nt.* 55 (1896-97) 271.
- "Centrifugal force" and "force of inertia." *Carr, G. S.* *Nt.* 45 (1892) 463, 497.
- "Density" and "specific gravity." *Cumming, L.* *Nt.* 37 (1888) 584.
- — —. *Foster, G. C.* *Nt.* 38 (1888) 6.
- — —. *Hospitalier, E.* *Nt.* 38 (1888) 6.
- — —. *Elder, H. M.* *Nt.* 38 (1888) 55.
- Dynamical units. *Smith, R. H.* *Nt.* 36 (1887) 53.
- Dynamics, elementary, nomenclature. *Walmsley, J.* *B. A. Rp.* (1887) 622.



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- "Force," use of term by modern writers. *Muirhead, H.* Glasg. Ph. S. P. 11 (1879) 370-.
- , work, tension and pressure, mistakes concerning. *Anon.* Cztg. Opt. 18 (1897) 167-, 175-.
- Industrial unit of work. *Résal, H.* C. R. 109 (1889) 523.
- "Inertia" and "mass," use of words. *Worthington, A. M.* Nt. 39 (1889) 248, 341-.
- , —, —, —. *Lodge, O. J.* Nt. 39 (1889) 270-, 367.
- , —, —, —. *Lousley, E.* Nt. 39 (1889) 413.
- "Machine," present and original meaning. *Holzer, H.* Civing. 33 (1887) 125-, 249-.
- Metric system, abbreviations in nomenclature. *Hirsch, A.* Par. Poids et Mes. PV. (\*1879) 35-.
- Mortars, nomenclature. *Schulatschenko, A.* Civing. 32 (1886) 561-.
- "Phoronomy," use instead of "kinematics." *Besant, W. H.* Nt. 45 (1892) 462-.
- Systematic measures, nomenclature for facilitating use. *Stoney, G. J.* B. A. Rp. (1894) 587-.
- Tools and their names, evolution. *Hartig, E.* Civing. 34 (1888) 767-.
- Uniform notation for mathematical and physical quantities. *Winkler, E., & Keck, —.* Civing. 30 (1884) 285-.
- Units of velocity and acceleration. *Oettingen, A. von.* D. Nt. Vh. (1896) (Th. 2, Hälfte 1) 63-.

## 0090 Methods of Research, Instruments and Apparatus.

- Calibration of instruments used in engineering laboratories. *Capper, D. S.* B. A. Rp. (1894) 759.
- , —, —, —. *Brit. Ass. Comm. (Unwin, W. C.)* B. A. Rp. (1895) 497-; (1896) 538-; (1897) 424-.
- Composition of harmonic motions. *Lecarme, J., & Lecarme, L.* C. R. 123 (1896) 44-.
- Hydrostatic apparatus. *Trusevič, A. A.* [1895] Vars. S. Nt. Tr. (1895-96) (C. R., Ps. C.) No. 1, 5 pp.
- Indicators and registering instruments, conditions necessary for. *Blondel, A. C. R.* 116 (1893) 748-.
- Instruments, etc., Paris, notes. *Benzenberg, J. F.* Gilbert A. 18 (1804) 372-.
- Kinegraph, for drawing resultant movements. *Clémentisch de Engelmeier, —.* J. de Ps. 3 (1894) 266-.
- Level of adjustable sensitiveness. *Mach, L.* Wien Ak. Sb. 102 (1893) (Ab. 2a) 754-.
- testers, old. *Galle, A.* Z. Instk. 17 (1897) 48-.
- Levels, alteration of glass. *Mylius, F. Z.* Instk. 8 (1888) 267-, 428-.
- , observations. *Reinhertz, C.* Z. Instk. 10 (1890) 309-, 347-.
- Movements in masonry of reservoirs, instrument for observation. *Porro, I.* C. R. 35 (1852) 299-.

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- Pleonometer, for measuring seat of railway embankments. *Dillon, J.* Dubl. R. S. J. 1 (1856-57) 60-.
- Testing machines, Pfaff, at Pribram. *Gstüttner, A.* Oestr. Z. Brgw. 38 (1890) 478-.

## MEASUREMENT OF DYNAMICAL QUANTITIES.

### 0100 General.

- Accurate straight edges, manufacture. *Wadsworth, F. L. O.* Franklin I. J. 138 (1894) 1-.
- Art of measuring. *Siemens, (Sir) C. W.* V. Nost. Eng. Mg. 15 (1876) 159-.
- Degree of accuracy of measures. *Macaluso, D.* Catania Ac. Gioen. At. 17 (1883) 173-.
- Errors in reading graduations. *Dorst, F. J.* Z. Instk. 6 (1886) 383-.
- Extremely small distances, appreciation. *Stoney, G. J.* Dubl. S. Sc. P. 7 (1891-92) 530-.
- Force (energy) and matter, persistence. *Dreher, E.* Emden Nf. Gs. Jbr. (1891-92) 37-.
- Marks on glass, method of making clear. *Martens, F. F.* A. Ps. C. 62 (1897) 206-.
- Measurements of precision, relation to condition of man. *Mendenhall, T. C.* J. H. Un. Cir. 13 (1893-94) 42-.
- Measuring instruments at the Philadelphia Electrical Exhibition. *Guerout, A.* Lum. Elect. 16 (1885) 7-.
- Metrological studies. *Wild, H. [I.]* St. Pét. Ac. Sc. Mm. 18 (1872) (No. 8) 26 pp.; 23 (1877) (No. 8) 22 pp.
- Metrology. *Chisholm, H. W.* Nt. 8 (1873) 268-.
- , chapter in. *Grafstrom, E.* Am. Eng. & Railroad J. 72 (1898) 289-.
- , progress of science in. *Harkness, W.* Smiths. Misc. Col. 33 (1888) Art. 4, xxxix (bis)-. (Wash. Ph. S. Bll. 10 (1888).)
- Microscope in workshop. *Rogers, W. A.* Mer. S. J. 6 (1886) 679-.
- , —, — (testing planeness of surfaces). *Rogers, W. A.* Am. Mer. S. P. 14 (1892) 128-.
- Modern measurements, refinement. *Brashear, J. A.* Sid. Mess. 9 (1890) 204-.
- Pressure, influence of small differences on results of accurate measurements and weighings. *Marek, W. J.* Carl Rpm. 17 (1881) 593-.
- Value of physical constants for Bucarest. *Negreanu, D.* Bucarest Ac. Rom. A. 19 (Pt. admin.) (1897) 390-; J. de Ps. 7 (1898) 425.
- Whitworth's planes, standard measures, and guns. *Tyndall, J.* R. I. P. 7 (1875) 524-.

## 0110 Units and dimensions; standards of measurement.

### UNITS AND DIMENSIONS.

- Bahia, M. B.* Arg. S. Ci. A. 29 (1890) 97-, 259-; 30 (1890) 21-, 81-, 161-, 241-.
- Absolute and gravitation systems. *Slate, F.* Nt. 44 (1891) 445.

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- Absolute units. *Bohn, C.* [1882] A. Ps. C. 18 (1883) 346-; 20 (1883) 690-.
- (Bohn). *Volkmann, P.* A. Ps. C. 19 (1883) 245-; 21 (1884) 516-.
- , *Moon, W. B. A.* Rp. (1891) 580.
- , *Kistjakovskij, V.* Rs. Ps.-C. S. J. 25 (Ps.) (1893) 81-; J. de Ps. 3 (1894) 237.
- and measurement in mechanics. *Kiel*, —. Bonn Niedr. Gs. Sb. (1896) 80-.
- , reduction to fundamental ones of time and length. *Sahulka, J.* Elekttech. Z. 11 (1890) 459-.
- , system. *Sundell, A. F.* [1881] Helsingf. Acta 12 (1883) 351-.
- , —. *Volkmann, P.* A. Ps. C. 16 (1882) 481-.
- , —. *Lehmann, O.* Karlsruhe Nt. Vr. Vh. 13 (1900) (Ab.) 365-.
- , —, and dimensions of physical quantities. *Krebs*, —. Cztg. Opt. 10 (1889) 7-.
- , —, electrical units. *Géraldy, F.* Lum. Élect. 5 (\*1881) 181-, 216-.
- , systems. *Szarvady, G.* Lum. Élect. 14 (1884) 321-, 375-, 413-.
- , —. *Boulanger, J.* Lum. Élect. 16 (1885) 8-.
- , —. *Winter, W.* Exner Rpm. 24 (1888) 471-.
- Algebraic symbols in applied mathematics. *Lodge, O. J.* Nt. 43 (1891) 513.
- , —, —. *Macaulay, W. H.* Nt. 43 (1891) 558.
- C. G. S. and centimeter dyne second system of units, and a gravitational experiment. *Fessenden, R. A.* Science 22 (1893) 339-.
- system. (Correction of statements in Everett's book.) *Tittmann, O. H.* Nt. 45 (1892) 581.
- (Tittmann). *Everett, J. D.* Nt. 45 (1892) 581-.
- , —, fundamental units. *Stok*, — *van der.* Batav. Ntk. Ts. 47 (1887) 588-.
- , —, metre in. *Torre, M.* Rv. Sc.-Ind. 22 (1890) 252-.
- , —, metric units of force, energy and power, larger than units of. *Thomson, (Prof.) Jas.* B. A. Rp. (1876) (Sect.) 32-.
- units. *Preece, W. H.* Elect. 21 (1888) 701-.
- Constants and units, report. *Guillaume, C. E.* B. A. Rp. (1892) 165-.
- Dimensional equations and change of units. *Shaw, W. N.* Camb. Ph. S. P. 5 (1886) 137-.
- , homogeneity in. *Clavenad, C. C. R.* 115 (1892) 470-.
- , — (Clavenad). *Vaschy*, —. C. R. 115 (1892) 597-.
- , and nomenclature. *Thomson, (Prof.) Jas.* B. A. Rp. (1878) 451-.
- , use. *Peddle, W.* Edinb. Mth. S. P. 9 (1891) 30-; 11 (1893) 7.
- Dimensions method, application to proof of physical theorems. *Neesen, F. A.* Ps. C. 7 (1879) 329-.
- of physical quantities. *Winter, W.* Exner Rpm. 21 (1885) 775-.
- , —, —. *Raverot, É.* Lum. Élect. 23 (1887) 101-; 36 (1890) 601-.

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- Dimensions of physical quantities, relation to directions in space. *Williams, W. L.* Ps. S. P. 11 (1892) 357-; Ph. Mg. 34 (1892) 234-.
- , —, —, suppressed. *Rücker, A. W.* [1888] L. Ps. S. P. 10 (1890) 37-; Ph. Mg. 27 (1889) 104-.
- , —, systems of, and laws of action. *Rovida, A.* Lum. Élect. 52 (1894) 601-.
- , —, theory. *Pietzker, F.* D. Nf. Vh. (1898) (Th. 2, Hälfte 1) 30-.
- , theory. *Sluginov, N. P.* (xii) Rs. Ps.-C. S. J. 16 (Ps., Pt. 1) (1884) 49-, 238-; Fschr. Ps. (1884) (Ab. 1) 28-.
- , —. *Abraham, H.* J. de Ps. 1 (1892) 516-.
- Dynamical units (B.A. rep., 1873). *Everett, J. D. B. A.* Rp. 43 (1873) 222-.
- , *Smith, R. H.* Nt. 36 (1887) 53.
- , absolute, system. *Rovida, A.* Rv. Sc.-Ind. [24 (1892)] 153-.
- Electrical units and definitions. *Basso, G.* It. S. Met. An. 5 (1890) 131-.
- Elements of physical work:—*vis viva*, force, etc. *Nystrom, J. W.* Franklin I. J. 48 (1864) 325-.
- Energetics. *Ostwald, W.* Leip. Mth. Ps. B. 43 (1891) 271-; 44 (1892) 211-.
- Fundamental units. *Mendenhall, T. C.* Am. S. CE. T. 30 (1893) 120-.
- in absolute systems, change. *Malagoli, R.* Éclair. Élect. 11 (1897) 535-.
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- Gaussian units. *Abria, O.* [1882] Bordeaux S. Sc. Mm. 5 (1883) 15-.
- Germany, system of units for. *Anon.* (vi 626) Hann. Z. Archt. Vr. 6 (1860) 481-.
- Homogeneity of formulæ. *Ledieu, A. C. H.* C. R. 96 (1883) 1692-.
- and physical equations. *Clavenad*, —. Lum. Élect. 48 (1893) 551-.
- in physical formulæ. *Bertrand, J. C. R.* 86 (1878) 916-.
- , reciprocity. *Ledieu, A. C. H.* C. R. 96 (1883) 1834-.
- M. K. S. system of units. *Rogers, F. J.* Ps. Rv. 11 (1900) 115-.
- Mass and force units. *Newcomb, S.* Science 2 (\*1883) 493-.
- Micrometric unit (micron  $\mu$ ). *Cornet*, —. [1880] Brux. S. Blg. Mer. Bil. 6 (\*1882) cxxvi-.
- Natural system of units. *Hauff, J. K. F.* Bode As. Jb. (1813) 228-.
- Nature, units of. *Stoney, G. J.* [1881] Dubl. S. Sc. P. 3 (1883) 51-.
- Notation for units. *Didion, I.* Metz Mm. Ac. 17 (1835-36) 227-.
- , —. *Macfarlane*, —. Cn. I. P. 3 (1886) 81-.
- Ostwald's system of units, and surface tension. *Schreiber, K.* Ps. Z. 1 (1900) 75-, 165-.
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- Reduction of units to a single dimension. *Budde, E.* A. Ps. C. 20 (1883) 161-.

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—, systems. *Pionchon, J.* Bordeaux S. Sc. Mm. 2 (1891) 1—.

—, theory. *Ledieu, A. C. H.* C. R. 95 (1882) 1328—; 96 (1883) 986—.

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—, and metric systems. *Penrose, F. C.* [1863] Br. Archt. I. Pp. (1864) 43—.

—, system. *Walmesley, R. M.* Sc. S. Arts T. 13 (1894) 445—.

—, of 17th century. *Gore, J. H.* Am. J. Sc. 41 (1891) 22—.

—, link of Gunter's chain as unit. *Lyman, B. S.* Am. As. P. 15 (1866) 100—.

—, with the sixteenth-of-an-inch as basis. *Holland, J. S.* (vi *Adds.*) Glasg. T. I. Eng. 1 (1857-58) 39—.

—, of weights, measures and coins, uniform. *Brown, S.* [1858] Assur. Mg. 8 (\*1860) 156—, 263—.

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—, —, recent discoveries. *Anon.* (vi 152) Bb. It. 53 (1829) 200—.

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- , —. *Thury, —. [1892] Arch. Sc. Ps. Nt. 29* (1893) 103.
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- , correction of scale. *Ewell, M. D. Am. S. Mer. P. 11* (1889) 64-.
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- , simple. *Reitz, F. H. Z. Instk. 6* (1886) 424-.
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- , 2, description and investigation of accuracy. *Stampfer, S. Wien Jb. Pol. I. 18* (1834) 149-.
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- — — — —, simple method for exact. *Stamkart, F. J. [1839] (viii) Arch. Néerl. 5* (1870) 15-.

- Curve measurer. *Demmel, K.* Z. Instk. 10 (1890) 360-.
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- Distance measurer for carriages. *Edgeworth, W.* Edinb. J. Sc. 3 (1825) 93-.
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- End-measures (*mesures à bouts*), automatic registering apparatus for comparison. *Hartmann, L.* C. R. 120 (1895) 1024-.
- (— — —), — — — (Hartmann). *Cornu, —.* C. R. 120 (1895) 1027-.
- , best form for ends. *Miller, W. H.* [1870] (viii) Camb. Ph. S. P. 2 (1876) 182-.
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- , Fizeau's apparatus for measuring. *Benoit, J. R.* Par. Poids et Mes. Tr. Mm. 1 (\*1881) C. 1-.
- , method of measuring. *Benoit, J. R.* Par. Poids et Mes. Tr. Mm. 6 (1888) 193 pp.
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- Leptometer, instrument for small measurements. *Sandberger, G.* Nass. Jb. 10 (1855) 83-.
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- , standards, comparison in air at different temperatures. *Pernet, J.* Par. Poids et Mes. Tr. Mm. 4 (1885) 170 + xxxii + civ pp.
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- , testing. *Koch, K. R.* [1882] A. Ps. C. 18 (1883) 511-; Freiburg B. 8 (\*1885) 123-.
- , single-lens, description. *Wollaston, W. H.* Phil. Trans. (1813) 119-.
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- Micrometer-point, Finger's reduction-tables. *Hagen, H. A.* Stett. E. Ztg. 20 (1859) 284-.
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- , (Tests of B. A. screws by Hervé diameters.) *Price*, W. A. B. A. Rp. (1896) 537—.
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- , electrical methods. *Ercolini*, G. N. Cim. 10 (1899) 241—.
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- , invariability in transit. *Ricci*, (le gén.) —. A. Cons. Arts et Mét. 10 (\*1873) 92—.
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- Thermometers, comparison, in length standardisation. (Presidential address, Aug. 1887.) *Rogers, W. A.* Am. S. Mer. P. (1887) 5-.
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- Wave-length of light as standard. *Govi, G.* [1871] Tor. At. Ac. Sc. 7 (1871-72) 115-.
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- — — — — sodium light as standard. *Michelson, A. A., & Morley, E. W.* Am. J. Sc. 34 (1887) 427-.
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- — — — —, measurement by. *Macé de Lépinay, J.* C. R. 100 (1885) 1377-; J. de Ps. 5 (1886) 405-; A. C. 10 (1887) 68-; J. de Ps. 2 (1893) 365-; A. C. 5 (1895) 210-.
- — — — —. *Shaw, W. N.* Camb. Ph. S. P. 6 (1889) 100.
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- — — — —, of cube in terms of. *Fabry, C., Macé de Lépinay, J., & Perot, A.* C. R. 128 (1899) 1317-.
- — — — —, value of standard metre in terms of. *Michelson, A. A.* C. R. 116 (1893) 790-.
- Wire gauge, standard. *Egleston, T., Metcalf, W., & Weeks, Jos. D.* [1877] Am. I. Mn. E. T. 6 (\*1879) 500-.
- — — — —, new British. *Anon.* Franklin I. J. 118 (1884) 95-.
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- Areas, instrument for. (Tachymeter.) *Cairo, G.* C. R. 3 (1836) 140, 200, 245-, 384.
- — — — —. (—) *Bertini, M.* [1840] Lucca At. Ac. 11 (1842) 197-.
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- — — — —, railway, graphic determination of areas. *Dubret, —.* V. Nost. Eng. Mg. 28 (1883) 1-.
- Curve and area integrating machine. (Panintegrimeter.) *Kohlmorgen, O.* Z. Instk. 16 (1896) 333-.
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- Planimeter (pedimeter). *Schiereck, P. F.* Dingler 82 (1841) 251-.
- , Amsler's. *Schmidt, G.* Dingler 221 (1876) 87-; 222 (1876) 584-.
- , combined. *Kloht, F.* Z. Instk. 5 (1885) 41-.
- , history. *Wolf, R.* Zür. Vjschr. 37 (1892) 111-; 38 (1893) 3-.
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- — — — —, Hamann's. *Hammer, E.* Z. Instk. 16 (1896) 361-; 17 (1897) 96.
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- — — — —, sphere, new. *Hele Shaw, H. S.* B. A. Rp. (1888) 584-.
- Planimeters, construction. *Amsler-Laffon, J.* Z. Instk. 4 (1884) 11-.
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- , —. *Maitre, J.* Gén. Civ. 28 (1895-96) 380-.
- , —, nomographic method. *Pesci, G.* Gén. Civ. 35 (1899) 41-.
- Calibrating-instrument, description. *Parrot, G. F.* Gilbert A. 41 (1812) 62-.
- Calibration, errors. *Handl, A.* Carl Rpm. 17 (1881) 295-.
- Cask, gauging. *Winter, F. de.* Brux. A. Tr. Pbl. 5 (1900) 938-.
- Cylinder. *Rasch, J. W.* N. Arch. Wisk. 7 (\*1881) 117-.
- Cylinders, approximate, instrument for volumes. *Neuhöfer, C.* Czgt. Opt. 21 (1900) 1.
- , scale for gauging capacity. *Airy, G. B.* Ph. Mg. 8 (1879) 246-.
- Cylindrical vessel, calibration. *Kurz, A.* Exner Rpm. 20 (1884) 529-.
- Gas volumes, formulae for correction. *Zenneck, L. H.* Würzb. Jb. Ph. Md. Gs. 1 (1828) 159-.
- Graduated glass vessels, verification. *Casamajor, P.* C. N. 38 (1878) 157-, 171-.
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- Metallic spheres, volume and density. *Goyder, G. (jun.)* [1886] S. Aust. R. S. T. 9 (1887) 15-.
- Metric system, application to cooperage. (Report by E. Mathieu.) *Fournerie, —.* C. R. 35 (1852) 201-.
- Pipes, formula for volume. *Uhr, G. af.* Jern-Kont. A. 10 (1826) 14-.
- Ponds, cubic content. *Lempe, —.* N. Bergm. J. 2 (1799) 382-.
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- Reliability of measuring vessels. *Weinstein, —.* D. Nf. Vh. (1893) (Th. 2, Hälfte 1) 26-.
- Sections of tubes of small bore, calibration. *Pensky, B. D.* Nf. Vh. (1891) (Th. 2) 563-.
- Ships, tonnage. *Kramp, C.* Strasb. S. Sc. Mm. 1 (1811) 301-.
- , —. *Henderson, A.* (vi Adds.) CE. I. P. 13 (1853-54) 1-; (iii) B. A. Rp. (1857) 62-.
- , —. *Avout, — d'.* C. R. 77 (1873) 872-.
- , —, English rules. *Dekke, A.* Nv. Archt. T. 9 (1868) 34-.
- , —, investigations with reference to laws for measurement. *Read, S.* Nv. Archt. T. 1 (1860) 121-.
- , —, law as established in Merchant Shipping Act of 1854. *Moorsom, G.* Nv. Archt. T. 1 (1860) 128-.

- Solids, apparatus for. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 3 (1894) (Sem. 2) 299-; Rv. Sc.-Ind. 27 (1895) 7-.
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- Air, weight of litre. *Broch, O. J.* Par. Poids et Mes. Tr. Mm. 1 (\*1881) A. 49-.
- , —, —, and density of gases. *Leduc, A.* C. R. 117 (1893) 1072-.
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- , —, millilitre. *Marek, W. J.* Par. Poids et Mes. Tr. Mm. 1 (\*1881) D. 26-.
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- , standard III, volume. *Broch, O. J.* Par. Poids et Mes. Tr. Mm. 4 (1885) 23-.
- , —, weighings. *Dumas, J. B., and others.* Par. Poids et Mes. Tr. Mm. 4 (1885) 1-.
- Metallic globules, minute, method of finding weight without balance. *Byrne, O.* (vi Add.) Chemist 5 (1844) 241-.
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- , —, weight. *Wild, H. A.* Cons. Arts et Mét. 10 (\*1873) 106-.
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—, —, —, —; and specific gravity of air. *Rice, E. W. M. Thomson A. Ph. 13 (1819) 339-; 14 (1819) 73-*.

—, true weight. *Studer, J. G. Gilbert A. 13 (1808) 122-*.

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—, in air, correction. *Fontana, A. N. Cim. 3 (1896) 324-*.

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—, direct determination of weight of displaced air. *Richarz, F. Berl. Ps. Gs. Vh. (1886) 83 bis-*.

—, limits of accuracy in ordinary. *Folkard, C. W. C. N. 29 (1874) 20-*.

—, theory, formulæ, constants and tables. *Marek, W. J. Par. Poids et Mes. Tr. Mm. 3 (1884) D. 53-*.

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—, new, description. *Prieur, C. A. A. C. 20 (1797) 274-*.

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*Schiff, H. Lieb. A. 107 (1858) 59-*.

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*Lermantov, V. V. Rs. Ps.-C. S. J. 17 (Ps.) (1885) 56-; J. de Ps. 5 (1886) 91-*.

*Sollas, W. J. Nt. 43 (1891) 404-*.

*Neufville, R. de. Frkf. a. M. Ps. Vr. Jbr. (1891-92) 41-*.

*Hallock, W. [1900] N. Y. Ac. A. 13 (1900-01) 476-*.

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*Berzelius, J. J., & Dulong, P. L. A. C. 15 (1820) 386-*.

*Thomson, T. Thomson A. Ph. 15 (1820) 232-; 16 (1820) 161-, 241-*.

*Hare, R. Silliman J. 16 (1829) 293-*.

*Regnault, V. C. R. 20 (1845) 975-*.

*Wagner, A. (Chem.). Carl Rpm. 12 (1876) 60-*.

*Chancel, G. C. R. 94 (1882) 626-*.

*Goldschmidt, H., & Meyer, V. Berl. B. 15 (1882) 137-*.

*Agamennone, G. Rm. R. Ac. Linc. Rd. 1 (1885) 105-*.

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*Joly, J. Dubl. S. Sc. P. 6 (1888-90) 534-*.

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*Cooke, J. P. Am. Ac. P. 24 (1889) 202-*.

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*Moissan, H., & Gautier, H. C. R. 115 (1892) 82-; A. C. 5 (1895) 568-*.

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*Schlesing, J. (fils). C. R. 126 (1898) 220-, 476-*.

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—, densimeter for. *Filopanti, Q. Bologna Rd. (1867) 83-*.

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- — — — — *Bunsen, R. W. A. C. Phm.* 141 (1867) 273-.
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- — — — —, manometric estimation. *Müller, F. C. G. Z. Angew. C.* (1890) 513-.
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- Sigl, J. Rpm. Phm.* 6 (1869) 234-.
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- , Atkins' system. *Jacobi, H. St. Pét. Ac. Sc. Bll.* 7 (1864) 438-.
- , tables for. *Tralles, J. G. Gilbert A.* 38 (1811) 349-.
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- , new. *Zambelli, L.* [1888] Ven. I. At. (1888-89) 147-.
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- Height of fluid columns, measurement by. *Bohm, C. Exner Rpm.* 22 (1886) 402-.

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- barometric. *Pillet, J.* As. Fr. C. R. (1885) (Pt. 2) 246-.
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- , for calculating quantity of sugar in solutions. *Treviranus, L. G.* Dingler 70 (1838) 36-; 74 (1839) 421-.
- , comparison of scale with density. *Wigner, G. W.* Anal. 5 (1880) 138-.
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- differential. *Fuchs, P.* Z. Angew. C. (1898) 505-.
- , of Fuchs. *Domke, —.* Z. Angew. C. (1899) 370-.
- Fahrenheit's, modification. *Niemann, J. H.* Lieb. A. 2 (1832) 357-.
- , —; and new form of balance. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 4 (1895) (Sem. 1) 77-; Rv. Sc.-Ind. 27 (1895) 205-; 28 (1896) 70-.
- form (Drijfbalans). *Harting, P.* Utr. Aant. Prv. Gn. (1849) 6-.
- glass, simple method of graduating. *Moore, C.* Thomson A. Ph. 11 (1826) 261-.
- graduation, new method. *Pouillet, C. S. M.* J. Phm. 36 (1859) 40-.
- , —. *Pouillet, C. S. M.* C. R. 56 (1863) 888-.
- Imperial Normal-Standard Commission on. *Kaisertl. Normal-Aichungs-Commission.* Z. Angew. C. (1890) 382-.
- improvements. *Arnim, L. A. von.* Gilbert A. 1 (1799) 412-.
- *Meissner, P. T.* Trommsdorff J. Phm. 22 (1813) 3-.
- inaccuracy. *Roster, G.* Sperim. 25 (1870) 265-.
- influence of capillarity. *Langberg, C.* (viii) Ps. Mdd. (1858) 1-; (iii) Pogg. A. 106 (1859) 299-.
- *Jacobi, H.* [1871] St. Pet. Ac. Sc. Mm. (Rs.) 20 (\*1872) (App. No. 4) 97 pp.; St. Pet. Ac. Sc. Mm. 17 (1872) (No. 5) 70 pp.
- *Duclaux, E. J.* de Ps. 1 (1872) 197-.
- *Coulter, —.* J. Phm. 23 (1876) 175-.
- *Mensbrugghe, G. van der.* Brux. Ac. Bll. 16 (1888) 31-.
- — and pressure of air. *Stamkart, F. J.* Amst. Vs. Ak. 1 (1866) (Ntk.) 320-; Arch. Néerl. 1 (1866) 355-.
- dirt on surface. *Marangoni, C.* (xii) Rv. Sc.-Ind. 12 (1880) 55-.
- international. *Spence, F. C.* N. 55 (1887) 240-.
- invisible. *Parragh, G.* Termst. Közl. 21 (1889) 121; Fsch. Ps. (1889) (Ab. 1) 339.
- manufacture. *Körner, F.* Erdm. J. Tech. C. 5 (1829) 331-.
- modification. *Foord, G.* [1871] Viet. R. S. T. 10 (1874) 113-.
- new. *Richter, J. B.* Berl. Gs. Nt. Fr. N. Schr. 3 (1801) 329-.
- *Lavigne, —.* Mntp. Rec. Bll. 4 (1811) 199-.
- *Alexander, —.* Pogg. A. 70 (1847) 137-.
- *Sedlaczek, J.* A. Ps. C. 158 (1876) 650-.
- *Dahm, G.* Dingler 228 (1873) 235-.
- *Handl, A.* Wien Ak. Sb. 92 (1886) (Ab. 2) 433-; 101 (1892) (Ab. 2a) 896-.
- *Láska, W.* Z. Instk. 9 (1889) 176.
- *Lesé, R.* Rv. Sc. 52 (1893) 220-.
- *Lohnstein, T.* Z. Instk. 14 (1894) 164-.
- *Vandevyver, L. N.* Arch. Sc. Ps. Nt. 34 (1895) 409-.
- *Sandrucci, A.* N. Cim. 6 (1897) 25-.
- normal. *Baumhauer, E. H. von.* Pogg. A. 113 (1861) 639-; Arch. Néerl. 1 (1866) 338-.
- origin. *Salverte, E. A. C.* 27 (1798) 113-.
- reading. *Marangoni, C.* Rm. R. Ac. Linc. Rd. 5 (1889) (Sem. 1) 657-.
- scale. *Witz, G.* As. Fr. C. R. (1884) (Pt. 2) 132-.
- , arbitrary. *Picini, A.* (xii) Rv. Sc.-Ind. 6 (1874) 249-.
- of equal divisions. *Gerlach, G. T.* Fresenius Z. 5 (1866) 185-.
- with 2 scales. *Planádvá, J. N.* Baumgartner Z. 2 (1833) 38-.
- scales. *Rauter, G.* Z. Angew. C. (1897) 215-.
- , adoption of uniform and invariable. *Witz, G.* As. Fr. C. R. (1883) 355-.
- , comparison. *Müller, (Dr.) J.* Lieb. A. 31 (1839) 81-.

- scales, comparison. *Gerlach, G. T.* Fresenius Z. 4 (1865) 1-.
- , construction and testing. *Schrön, H. L. F.* (xii) Arch. Phm. 83 (1843) 1-.
- for densities of liquids and volume of the kilogramme. *Jeannel, J.* Bordeaux J. Md. 4 (1859) 31-.
- , graduation, new mode. *Ricard, —.* Caen Tr. (1811) 124-.
- , —, —. *Smith, D. B.* [1825] Philad. Coll. Phm. J. 2 (1831) 9-.
- , — and testing. *Neumann, A.* Baumgartner Z. 5 (1837) 76-.
- for sea water. *Schück, A.* Z. NW. 68 (1895) 437-.
- —. *Thoulet, J.* Rv. Mar. et Col. 124 (1895) 696-.
- —, table for reduction of observations. *Tittmann, O. H.* U. S. Coast Geod. Sv. Bll. No. 18 (1890) 175-.
- siphon-, to find temperature of maximum density of water. *Meikle, H.* Tilloch Ph. Mg. 68 (1826) 166-.
- , improved. *Meikle, H.* Ph. Mg. 4 (1828) 258-.
- used as. *Meikle, H.* Edinb. N. Ph. J. 2 (1827) 366-.
- sources of error in using. *Fock, A.* Z. Ps. C. 2 (1888) 296-.
- standard. *Göckel, H.* Z. Angew. C. (1899) 712-.
- and stereometers. *Hachette, J. N. P.* A. C. 24 (1797) 333-.
- with temperature correction scale. *Fuchs, P.* Z. Angew. C. (1899) 15-.
- total immersion (Pisati system). *Reggiani, N.* Rm. R. Ac. Linc. Rd. 6 (1890) (Sem. 1) 99-.
- —. *Warrington, A. W.* B. A. Rp. (1898) 791; Ph. Mg. 48 (1899) 498-.
- —, variable inclination and reflection hydrometers. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 9 (1900) (Sem. 1) 33-, 71-.
- Twaddle's. *Dingler, E. M.* Dingler 67 (1838) 147-.
- universal. *Lanier, —.* Bll. Phm. 4 (1812) 307-.
- use. *Malý, F.* Z. Instk. 12 (1892) 61-.
- for variable volume and constant weight. *Libert, —.* Finist. S. Sc. Bll. 6 (Fasc. 2) (1884) 50-.
- Hydrometric measurements in glass vessels, temperature correction, tables for. *Fuchs, P.* Z. Angew. C. (1898) 745-, 909-.
- Hydrometry. *Hassenfratz, J. H.* A. C. 26 (1798) 3-, 132-, 188-; 27 (1798) 118-; 28 (1798) 3-; 33 (1799) 3-.
- (Hassenfratz). *Schmidt, G. G.* Gilbert A. 4 (1800) 194-.
- *Descroizilles, —.* [1804] A. C. 58 (1806) 237-.
- *Bellani, A.* Mil. G. S. Inc. 1 (1808) 229-.
- *Delezenne, —.* Lille Tr. (1819-22) 48-.
- *Nobile, A.* [1829] Nap. At. I. Inc. 5 (1834) 79-.
- *Göckel, H.* Z. Angew. C. (1898) 867-.
- Hydrometry and the centigrade hydrometer. *Francœur, L. B.* C. R. 14 (1842) 328-; Par. Bll. S. Encour. 41 (1842) 181-.
- , formulæ of Tadini and Eytelwein. *Franchini, P.* (vii) Bb. It. 5 (1842) 73-.
- , graphic representation in. *Meinecke, J. L. G.* (viii) Rpm. Phm. 5 (1819) 175-.
- , sliding rod in. *Hare, R.* Tilloch Ph. Mg. 67 (1826) 266-.
- Instrument for density determinations. *Ham, F.* C. Gz. 2 (1844) 125.
- Liquid and gaseous carbon dioxide. *Heen, P. de.* Brux. Ac. Bll. 31 (1896) 379-.
- metals, density and thermal expansion of certain. *Vicentini, G., & Omodet, D.* Tor. Ac. Sc. At. 23 (1887-88) 38-.
- methane, oxygen and nitrogen. *Olzewski, K.* Krk. Ak. (Mt.-Prz.) Rz. 14 (1886) 181-, 197-; A. Ps. C. 31 (1887) 58-.
- Liquids and bodies lighter than water. *Hockin, C., & Matthiessen, A.* Lb. 1 (1867) 189-.
- at their boiling points. *Schiff, R.* Berl. B. 14 (1881) 2761-.
- — higher temperatures. *Schiff, R.* Berl. B. 18 (1885) 1538-.
- Litrameter. *Hare, R.* (vi Add.) Ph. Mg. 4 (1828) 187-.
- Manometer, densities by. *Schiff, H.* Lieb. A. 121 (1862) 82-.
- Mercury, density at 0° C. *Volkman, P.* A. Ps. C. 13 (1881) 209-.
- , — in relation to barometric pressure. *Marek, W. J.* Par. Poids et Mes. Tr. Mm. 2 (\*1883) D. 18-.
- Method, new. *Cagnassi, M.* (xii) Rv. Sc.-Ind. 11 (1879) 169-.
- , —. *Sommerkorn, H.* Berl. B. 13 (1880) 143-.
- , —. *Sandrucci, A.* Rv. Sc.-Ind. 19 (1887) 65-.
- Oils. *Dudley, C. B., & Pease, F. N.* Am. Eng. & Railroad J. 69 (1895) 449-.
- Pyknometer. *Boot, J. C.* C. Ztg. 20 (1896) 616.
- , glass, with constant volume and precision adjustment. *Fuchs, P.* Z. Angew. C. (1898) 359-.
- , improved. *Voeller, F.* Z. Angew. C. (1891) 401.
- , —. *Squibb, E. R.* Am. C. S. J. 19 (1897) 111-.
- for light liquids. *Göckel, H.* Z. Angew. C. (1899) 1194-.
- measurements, temperature correction tables. *Fuchs, P.* Z. Angew. C. (1899) 25-.
- , small variation in. *Wiedemann, E. E. G.* A. Ps. C. 17 (1882) 983-.
- , Sprengel's, modification. *Minozzi, A.* Rm. R. Ac. Linc. Rd. 8 (1899) (Sem. 1) 450-.
- , Wiedemann's, modification. *Schulze, R.* A. Ps. C. 28 (1886) 144.
- Refraction of light, instrument for measuring by. *Mojon, G.* Genova Mm. S. Md. 1 (1802) 49-.
- Salinometer for measuring density of brine in marine steam boilers. *Russell, J. S.* Edinb. N. Ph. J. 34 (1843) 278-.

- Sea water. *Buchanan, J. Y.* R. S. P. 23 (1875) 301-.
- *Makarov, S. O.* Rs. Ps.-C. S. J. 23 (Ps.) (1891) 30-; *Fschr. Ps.* (1891) (Ab. 1) 51.
- Variation of density produced by surface pressure in a liquid. *Monti, V.* Tor. Ac. Sc. At. 31 (1895) 150- or 194-.
- Viscous and foamy liquids. *Genieser, A. Z.* Angew. C. (1890) 44-.
- substances. *Brühl, J. W.* Berl. B. 24 (1891) 182-, 2455-.
- *Scheibler, C.* Berl. B. 24 (1891) 357-.
- Volumenometer, double, for liquids. *Marangoni, C.* N. Cim. 20 (1886) 112-; 6 (1897) 407-.
- Water. *Stampfer, S.* Wien Jb. Pol. I. 16 (1830) 1-.
- , pure, volume and density. *Broch, O. J.* Par. Poids et Mes. Tr. Min. 1 (\*1881) A. 59-.

## DENSITY OF SOLIDS.

- Tralles, J. G.* Gilbert A. 27 (1807) 261-.
- Rau, A.* Ac. Cæs. Leop. N. Acta 9 (1818) 325-.
- Osann, G.* Pogg. A. 73 (1848) 605-.
- Laroque, F.* Toul. Mm. Ac. 6 (1850) 152-.
- Raimondi, A.* Pogg. A. 99 (1856) 639-.
- Dobbie, J. J., & Hutcheson, J. B.* Glasg. Ph. S. P. 15 (1884) 82-.
- Kleinstück, O.* Arch. Phm. 226 (1888) 166-; C. Ztg. 14 (1890) 233-.
- Leick, W.* N.-Vorp. Mt. 27 (1896) 96-.
- Negreanu, D.* Bucarest Ac. Rom. A. 22 (Pt. admin.) (1900) 72-.
- Absolute and specific weight of bodies in liquid. *Mohr, C. F.* Pogg. A. 112 (1861) 420-.
- — — — — precipitates in liquids. *Fleck, H.* Pogg. A. 113 (1861) 160-.
- — — — — (Fleck's method). *Mohr, C. F.* Pogg. A. 113 (1861) 655-.
- — — — — *Kahl, E.* Schlömilch Z. 7 (1862) 456-.
- Adhesion, determinations affected by. *Tünnermann, J.* Trommsdorff N. J. Phm. 26 (1833) (St. 2) 93-.
- Alloys. *Matthiessen, A.* C. S. J. 5 (1867) 201-.
- Apparatus. *Eckfeldt, J. R., & Dubois, W. E.* Silliman J. 22 (1856) 294-.
- *Fulton, H. B.* S. C. In. J. 11 (1892) 305-.
- for rapid determination. *Brown, M. W.* N. Eng. I. Mn. E. T. 36 (1887) 95-.
- Arabian determinations. *Wiedemann, E. E. G.* A. Ps. C. 20 (1883) 539-.
- Areometer, new (volumenometer). *Say, H.* A. C. 23 (1797) 1-.
- , Say's. *Arnim, L. A. von.* Gilbert A. 2 (1799) 238-.
- , —, improvement. *Miller, W. H.* Ph. Mg. 5 (1834) 203.
- Barley and Scotch Bigg, new instrument for. *Keith, G. S.* Edinb. Ph. J. 5 (1821) 173-.
- Cement. *Piens, C.* Brux. A. Tr. Pbl. 3 (1898) 453-.
- Correction. *Osann, G.* Kastner Arch. C. 2 (1830) 58-, 271-.
- , error in certain. *Mach, E.* Carl. Rpm. 7 (1871) 377.
- Crystals. *Berkeley (Earl of).* B. A. Rp. (1898) 837-.
- Decomposable bodies. *Christomanos, A. C.* Berl. B. 10 (1877) 782-.
- Density bottle, measurement by. *Jenzsch, G.* Pogg. A. 99 (1856) 151-.
- for powders. *Louis, H.* S. C. In. J. 13 (1894) 322-.
- Flotation, determination of densities by. *Schaffgotsch, F. von.* Pogg. A. 116 (1862) 279-.
- Gold coinage. *Broch, O. J.* N. Mg. Ntvd. 21 (1876) 363-.
- in gold-silver alloys. *Louis, H.* [1893] Am. I. Mn. E. T. 22 (1894) 117-, 724-, 775.
- Gravimeter, new, for weight and density of solids. *Bustamente, J. M.* Edinb. J. Sc. 10 (1829) 207-.
- Hydrometer, differential, for powders. *Fuchs, P.* Z. Angew. C. (1898) 623-.
- , Nicholson's, improved. *Briffandon, —.* Lyon A. S. L. (1836) 15 pp.
- for solids. *Baumgartner, A. von.* Baumgartner Z. 1 (1826) 5-.
- — — *Buignet, —.* J. de Ps. 9 (1880) 93-.
- — — *Munroe, C. E.* Smiths. Misc. Col. 33 (1888) Art. 1, 26- (Wash. Ph. S. Bill. 6 (1884).)
- — —, new form. *Failyer, G. H.* Kan. Ac. Sc. T. 11 (1889) 104.
- Ice. *Osann, G.* Kastner Arch. C. 1 (1830) 95-.
- *Dufour, L.* Bb. Un. Arch. 8 (1860) 89-; 14 (1862) 5-.
- *Nichols, E. L.* Ps. Rv. 8 (1899) 21-.
- , 0° to -20° C. *Brunner von Wattenwyll, C.* A. C. 14 (1845) 369-.
- Insoluble substances. *Symons, W. H.* Phm. J. 19 (1889) 205-.
- Instrument for densities. *Dunnington, F. P.* C. N. 41 (1880) 154-.
- — and weights. *Fox, R. W.* Cornwall Pol. S. Rp. (1847) 19-.
- — —, without weights or calculation. *Adie, A.* Edinb. Mm. Vern. S. 3 (1817-20) 495-.
- , new, for solids by measuring water displaced. *Baddeley, (Lt.) —.* Silliman J. 18 (1830) 263-.
- Masonry. *Reuss, G.* As. Fr. C. R. (1897) (Pt. 1) 184-.
- Method, new. *Lévy, A.* Quetelet Cor. Mth. 6 (1830) 208-.
- , — *Persoz, J.* Par. A. Cons. 5 (1864) 532-; C. R. 60 (1865) 405.
- , — *Sonstadt, E.* C. N. 29 (1874) 127-.
- , rapid. *Lezé, R.* Gén. Civ. 4 (1883-84) 181.
- Minerals, apparatus for minute fragments. *La Touche, T. D.* Nt. 53 (1895-96) 199.
- , —, new. *Pisani, F.* C. R. 86 (1878) 350-.
- Minute solids, density and mass. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 9 (1900) (Sem. 2) 261-.
- Organic solids. *Schröder, H.* Berl. B. 12 (1879) 561-, 1611-; 13 (1880) 1070-.
- Porous and friable substance. *Parize, [P.]* (xii) Finist. S. Sc. Bill. 4 (Fasc. 2) (1882) 45-; J. de Ps. 5 (1886) 222-.
- substances. *Reszow, N. A.* Fschr. Ps. (1889) (Ab. 1) 66.



Porous substances, determination of density by enclosing in wax. *Aschauer, J. V.* Baumgartner Z. 4 (1837) 176-.

Possible errors in determination. *Pierre, V.* (xn) Lotos 16 (1866) 22-.

Powders. *Rüdorf, F.* Berl. B. 12 (1879) 249-.

— *Smeth, W. F.* [1888] Dubl. S. Sc. P. 6 (1888-90) 61-.

— *Lenoble, E.* A. C. Anal. 3 (1898) 361-; 4 (1899) 44-.

— *Vandevyver, —.* A. C. Anal. 4 (1899) 2-.

—, apparatus for. *Lestie, J.* QJ. Sc. 21 (1826) 374-.

—, — *Bremer, G. I. W.* Rec. Tr. C. P.-Bas 17 (1898) 263-, 404-.

—, heavy, small quantities. *Joly, J.* Dubl. S. Sc. P. 5 (1886-87) 41-.

Pyknometer. *Berkeley, (Earl of).* [1895] Mn. Mg. 11 (1897) 64-.

—, modification. *Gintl, W. F.* Fresenius Z. 8 (1869) 122-.

—, — *Kahlbaum, G. W. A.* A. Ps. C. 19 (1883) 378-.

—, physico-chemical. *Arpago, R.* Rv. Sc.-Ind. 25 (1893) 126-.

PyknoSCOPE. *Zenneck, L. H.* Kastner Arch. Ntl. 14 (1828) 81-.

Salts soluble in water. *Andreae, J. L.* J. Pr. C. 30 (1884) 312-.

— — — *Retgers, J. W.* Z. Ps. C. 3 (1889) 289-; 4 (1889) 189-; 11 (1893) 328-.

Seeds. *Wolfenstein, O.* (xii) J. Lndw. 23 (1875) 401-.

Soluble substances. *Del Lupo, M.* (xii) Rv. Sc.-Ind. 13 (1881) 161-.

— — —, new method for. *Zehnder, L.* A. Ps. C. 29 (1886) 249-.

Sprengel's apparatus, modification. *Sollas, —.* Dubl. S. Sc. P. 5 (1886-87) 623-.

Spring balance, densities by. *Creighton, H.* QJ. Sc. 13 (1822) 257-.

Substances with large pores. *Guyton de Morveau, L. B.* A. C. 60 (1806) 121-.

Volumenometer see Areometer (Say).

Volumenometer. *Kopp, H.* A. C. 6 (1842) 380-.

— *Raikow, P.* C. Ztg. 12 (1888) 525.

— *Muraközy, K.* [1890] Föl. Közl. 21 (1891) 117-, 148-.

—, modified, application. *Kalecsinszky, S.* [1890] Föl. Közl. 21 (1891) 109-, 142-.

—, new. *Tschaplowitz [Chaplovitz], F.* Fresenius Z. 18 (1879) 440-.

—, — *Paalow, C. A.* A. Ps. C. 13 (1881) 332-; 14 (1881) 176.

—, — *Muraközy, K.* Termt. Közl. 25 (1893) (Suppl.) 33-.

—, — *Myers, J. E.* [1893] L. Ps. S. P. 12 (1894) 372-; Ph. Mg. 36 (1893) 195-.

—, — *Oberbeck, A.* A. Ps. C. 67 (1899) 209-.

— for powders. *Schumann, C. C.* Ztg. 8 (1884) 1778-.

—, simple form. *Linebarger, C. E.* Am. C. S. J. 21 (1899) 435-.

— and weighing apparatus, description. *Ångström, K.* Stockh. Öfv. (1895) 643-; Föchr. Ps. (1895) (Ab. 1) 24-.

Volumenometers, new. *Baumhauer, E. H. von.* Arch. Néerl. 3 (1868) 385-.

Wood. *Anon.* (vi 1239) Tilloch Ph. Mg. 57 (1821) 366-.

## DENSITY OF SOLIDS AND LIQUIDS.

*Hare, R.* Silliman J. 11 (1826) 121-.

Apparatus. *Nicol, W. W. J.* C. N. 47 (1883) 85-.

— *Raikow, P., & Prodanow, N.* C. Ztg. 10 (1886) 1556.

Areopyknometer with arbitrary scale. *Piccini, A.* (xn) Rv. Sc.-Ind. 11 (1879) 14-.

Densimeter for solids and liquids. *Courtonne, H. J.* de Ps. 5 (1896) 315-.

— — — —, new. *Pâquet, E.* Par. S. C. Bil. 24 (1875) 51-.

— — — —, — *Machado, V.* Lisb. J. Sc. Mth. 6 (1878) 285-.

Formula for density. *Almeida, C. A. M. de.* [1879] Lisb. J. Sc. Mth. 7 (1880) 20-.

Gravimeter for solids and liquids. *Guyton de Morveau, L. B.* Nicholson J. 1 (1797) 110-.

Hydrometer for solids and liquids. *Atkins, G.* Tilloch Ph. Mg. 31 (1808) 254-.

— — — —, *Piervliet, — van.* Brux. S. Sc. A. 14 (1890) (Pt. 1) 60-.

Hydrostatic weighings. *Lummer, O.* Berl. Ps. Gs. Vh. (1887) 65 (bis)-.

— —, capillary influence. *Macé de Lépinay, J.* J. de Ps. 5 (1896) 266-.

— — — —, difficulty. *Macé de Lépinay, J.* J. de Ps. 5 (1886) 416-.

Ice and sea-water, density and volumes. *Ashe, W. A.* Science 10 (1887) 24.

Instrument, new. *Nicholson, W.* [1785] Manch. Ph. S. Mm. 2 (1789) 386-.

Method of determination. *Gentile, —.* J. Phm. 5 (1867) 401-.

Pendulum, application. *Serra-Carpi, G.* C. R. 64 (1867) 659-.

Pyknometer for volume and density of solids and liquids. *Bensemann, R.* Rpm. Anal. C. 7 (1887) 19-.

Volumenometer for solids and liquids. *Kopp, H.* Lieb. A. 35 (1840) 17-.

## VAPOUR DENSITIES.

*Couerbe, J. P.* Bordeaux Act. (1840) 5-.

*Sainte-Claire Deville, H.* C. R. 56 (1863) 729-.

*Pfaundler, L.* Innsb. Nt. Md. B. 1 (1870) 40-.

*Croullebois, M.* C. R. 78 (1874) 496-.

(Croullebois.) *Sainte-Claire Deville, É. H.* C. R. 78 (1874) 534-.

(Sainte-Claire Deville.) *Croullebois, M.* C. R. 78 (1874) 805-.

*Brühl, J. W.* Berl. B. 9 (1876) 1368-.

*Hautefeuille, —, & Troost, —.* C. R. 83 (1876) 220-.

*Ciamician, G. L., & Goldschmidt, G.* Wien Ak. Sb. 75 (1877) (Ab. 2) 431-.

*Sainte-Claire Deville, É. H.* C. R. 84 (1877) 1256-.

(Sainte-Claire Deville.) *Wurtz, C. A.* C. R. 84 (1877) 1347-.



*Meyer, V.* Berl. B. 10 (1877) 2068-; 11 (1878) 1867-.

*Hofmann, A. W.* Berl. B. 11 (1878) 1684-.

*Troost, L. J.* C. R. 86 (1878) 331-, 1394-.

*Piccard, J.* Berl. B. 13 (1880) 1079-.

*Deuar, J., & Scott, A.* B. A. Rp. (1881) 597.

*Meyer, V.* Berl. B. 15 (1882) 2775-; 19 (1886) 1861-.

*Pawlewski, B.* (xii) Kosmos (Lw.) 8 (1883) 93-; (x) Berl. B. 16 (1883) 1293-.

*Nilson, L. F., & Pettersson, O.* A. C. 9 (1886) 554-.

*Schall, C.* Berl. B. 20 (1887) 1435-, 1759-; 21 (1888) 100-.

*Bott, W.* C. S. P. 4 (1888) 110.

*Richards, T. W.* C. N. 59 (1889) 87-.

*Krause, A., & Meyer, V.* Z. Ps. C. 6 (1890) 5-.

*Schall, C.* Berl. B. 23 (1890) 919-, 1701-.

*Lunge, G., & Neuberg, O.* Berl. B. 24 (1891) 729-.

*Schall, C.* J. Pr. C. 50 (1894) 87-.

*Winkler, L. W.* C. Ztg. 23 (1899) 627.

acoustic method. *Goldschmidt, H.* Berl. B. 13 (1880) 768-.

apparatus. *Grabowski, A.* A. C. Phm. 138 (1866) 174-.

— (in barometric vacuum). *Hofmann, A. W.* D. C. Gs. B. 1 (1868) 198-; Berl. B. 9 (1876) 1304-.

— *Bott, W., & Macnair, D. S.* Berl. B. 20 (1887) 916-, 1617.

— *Dyson, G.* C. N. 55 (1887) 88.

— *Macnair, D. S.* C. N. 55 (1887) 289.

— *Harker, J. A.* C. N. 62 (1890) 180.

— for determination by Gay-Lussac's method. *Warren, C. M.* [1866] Am. Ac. P. 7 (1868) 99-.

—, *Grabowski's*, modification. *Pfaundler, L.* D. C. Gs. B. 5 (1872) 575-.

—, *Hofmann's*, modification. *Wichelhaus, H.* D. C. Gs. B. 3 (1870) 166-.

—, —, *Engler, C.* Berl. B. 9 (1876) 1419-.

—, —, *Muir, M. M. P., & Suguira, S.* C. S. J. (1877) 2 (140-).

—, —, trough for. *Easterfield, T. H.* C. N. 60 (1889) 250-.

in barometric vacuum. *Brühl, J. W.* Berl. B. 12 (1879) 197-.

*Dulong's* method. *Dumas, J. B.* C. R. 78 (1874) 536-.

*Dumas' method*, improved modification. *Habermann, J.* [1876] Wien Ak. Sb. 74 (1877) (Ab. 2) 423-.

by gaseous displacement under varying pressure. *Meunier, J.* C. R. 98 (1884) 1268-.

in glass vessels at boiling-point of selenium. *Troost, L. J.* C. R. 95 (1882) 30-.

at high temperatures. *Meyer, V., & Recklinghausen, M. von.* Berl. B. 30 (1897) 1926-.

—, —, of substances which attack mercury. *Pfaundler, L.* Berl. B. 12 (1879) 165-.

history. *Hofmann, A. W.* Berl. B. 10 (1877) 962-.

— *Brown, J. T.* B. A. Rp. (1879) 304-.

*Hofmann's* method. *Gabba, L.* Mil. I. Lomb. Rd. 2 (1869) 50-.

— *Tilden, W. A.* C. N. 37 (1878) 219.

influence of shape of bulb. *Biltz, H.* Berl. B. 21 (1888) 2772-.

of inorganic substances. *Meyer, C., & Meyer, V.* Berl. B. 12 (1879) 609-, 1282-.

— — — at very high temperatures. *Meyer, C., & Meyer, V.* Berl. B. 12 (1879) 1112-.

at low temperatures, *V. Meyer's* method, modification. *Perrenoud, P.* Lieb. A. 187 (1877) 77-.

*V. and C. Meyer's* method. *Williams, C. G.* C. N. 39 (1879) 110.

*V. Meyer's* method. *Smith, Watson.* C. N. 39 (1879) 66-.

— — *Meyer, L.* Berl. B. 13 (1880) 991-.

— — *Ekstrand, A. G., & Pettersson, O.* Berl. B. 13 (1880) 1185-.

— — modified. *Gudeman, E.* Am. C. S. J. 12 (1890) 399.

— — — for use under reduced pressure. *Richards, T. W.* C. N. 59 (1889) 39-.

— —, possible cause of error in. *Piccard, J.* [1891] Laus. S. Vd. Bll. 27 (1892) 265-.

— — simplified. *Schwarz, H.* Berl. B. 16 (1883) 1051-.

— — — (Schwarz). *Meyer, V.* Berl. B. 17 (1884) 1334-.

*Naumann's* method. *Horstmann, A.* Berl. B. 11 (1878) 204-.

of organic substances with high boiling-points. *Troost, L. J.* C. R. 89 (1879) 351-.

*Pettersson and Ekstrand's* method, modification. *Schall, C.* Berl. B. 18 (1885) 2068-.

under reduced pressure. *Malfatti, H., & Schoop, P.* Z. Ps. C. 1 (1887) 159-.

— — *Meyer, V.* D. Nl. Tbl. (1889) 220.

— — *Schall, C.* Berl. B. 22 (1889) 140-; 23 (1890) 919-; 25 (1892) 1439-; J. Pr. C. 45 (1892) 134-; 62 (1900) 536-.

— —, apparatus for. *Eykman, J. F.* Berl. B. 22 (1889) 2754-.

— —, *V. Meyer's* method. *Hoff, J. H. van't, & Romeny, J.* (xii) Mbl. Nt. 8 (1878) 135-.

saturated. *Dupré, A.* C. R. 54 (1862) 972-.

—, of liquids at different temperatures. *Pérot, A.* Nancy S. Sc. Bll. (1886) (Fasc. 20) xxxvii-.

sources of error. *Alexeev, W.* Berl. B. 18 (1885) 2898-.

— — — in application of law of mixtures. *Hautefeuille, —, & Troost, —.* C. R. 83 (1876) 975-.

steam, influence of hygroscopic character of glass on determination. *Grimaldi, G., & Macaluso, D.* Rm. R. Ac. Linc. T. 6 (1882) 264-.

— at all temperatures, apparatus for. *Fairbairn, W.* Manch. Ph. S. P. 1 (1857-60) 70-.

of substances boiling above 440° and of those attacking mercury or Wood's metal. *Meyer, C., & Meyer, V.* Berl. B. 11 (1878) 2253-.

— below their boiling-points. *Demuth, R., & Meyer, V.* Berl. B. 23 (1890) 311-.

— with high boiling-points. *Meyer, V.* Berl. B. 9 (1876) 1216-.

- of substances with high boiling-points. *Klobukow, N. von.* A. Ps. C. 22 (1884) 493-.
- — — — —, under reduced pressure. *La Coste, W.* Berl. B. 18 (1885) 2122-.
- — — — —, — — — — —. *Schall, C.* Berl. B. 20 (1887) 1827-, 2127-.
- — — — — low boiling-points. *Klobukow, N. von.* A. Ps. C. 22 (1884) 465-.
- and temperature of experiment, simultaneous determination. *Nilson, L. F., & Pettersson, O.* Stockh. Ak. Hndl. Bh. 11 (1887) No. 6, 16 pp.
- in vapour of phosphorus pentasulphide. *Knecht, W.* [1879] Lieb. A. 202 (1880) 31-.
- of vapours which attack porcelain at red heat. *Züblin, H., & Meyer, V.* Berl. B. 12 (1879) 2204-.
- volatile liquids, at temperatures below boiling-point. *Playfair, L., & Wanklyn, J. A.* Edinb. R. S. T. 22 (1861) 441-.
- water. *Ward, F. O.* C. N. 16 (1867) 15-, 38-, 50-.
- at white heat, of elements and compounds. *Biltz, H., & Meyer, V.* Gött. Nr. (1889) 347-.

## BALANCE.

- Tralles, J. G.* Gilbert A. 29 (1808) 442-; 30 (1808) 384-.
- Peale, F.* Franklin I. J. 14 (1847) 59-.
- Wolsa, C. A.* [1849] Helsingf. Acta 3 (1852) 413-.
- Carl, P.* Carl Rpm. 1 (1866) 7-.
- accurate and convenient, new plan. *Lüdicke, M. A. F.* Gilbert A. 1 (1799) 123-.
- — large. *Mendelssohn, N.* Gilbert A. 29 (1808) 153-.
- adjusting, for custom house officers and inspectors. *Hartig, T.* Dresden Sb. Isis (1871) 239-.
- adjustment device for. *Green, F. T.* Am. C. S. J. 16 (1894) 699.
- of knife edges. *Gauss, C. F.* As. Nr. 14 (1837) 241-.
- , machine for. *Hasemann, H.* Z. Instk. 14 (1894) 50-.
- aerometric, for density of air. *Potter, R.* Ph. Mg. 37 (1850) 81-.
- aerostatic, for density of gases. *Lommel, E.* A. Ps. C. 27 (1886) 144.
- analytical, damping arrangement. *Arzberger, F.* Lieb. A. 178 (1875) 382-.
- , —, *Geiger, —.* C. Ztg. 15 (1891) 476.
- , improvements. *Westphal, G.* Fresenius Z. 7 (1868) 294-.
- apparatus for interchange of pans. *Classen, —.* Z. Instk. 15 (1895) 101-.
- applications of principle. *Strait, H.* Silliman J. 27 (1835) 92-.
- assay. *Botelho de Lacerda, C.* Lisb. Mm. Ac. Sc. 3 (1814) (pte. 2) 179-.
- , auxiliary. *Law, R.* C. S. J. 69 (1896) 526-.
- , improved. *Makins, G. H.* C. S. J. 6 (1854) 36-.
- , improvements. *Narci, C. P. T.* J. Mines 7 (1797-98) 455-.
- , recent. *Austin, L. S.* [1897] Colo. Sc. S. P. 6 (1897-1900) 34-.
- automatic. *Weber, L.* [1893] Schl.-Holst. Nt. Vr. Schr. 10 (1895) 309.
- exchange of pans. *Stadthagen, H.* Z. Instk. 20 (1900) 206-.
- beam, best form. *Kernot, W. C.* [1880-1894] Vict. R. S. T. 17 (1881) 19-; Vict. R. S. P. 7 (1895) 141-.
- , improved. *Arzberger, J.* Gilbert A. 46 (1814) 294-.
- , influence of bending. *Pierre, V.* Prag Sb. (1862) 13-.
- short (Schickert's). *Hartig, T.* Dresden Sb. Isis (1871) 56-.
- —. *Sartorius, F.* C. Ztg. 9 (1885) 1299.
- beams of aluminium. *Frerichs, F. T.* Lieb. A. 178 (1875) 365-.
- , Emery's support. *Schwirkus, G.* Z. Instk. 4 (1884) 261-.
- of steel, influence of magnetism. *Studer, J. G.* Gilbert A. 13 (1803) 122-.
- chemical. *Dittmar, W.* (xii) Z. Instk. 1 (1881) 313-; 2 (1882) 63-.
- , *Hase, R.* Z. Angew. C. (1898) 736-.
- , effect of flexibility. *Proctor, B. S.* [1876] Newcastle C. S. T. 3 (1877) 183-.
- , new; theory of construction of balances. *Cooke, I. B.* Phm. J. 1 (1860) 360-.
- construction. *Kater, H.* [1821] QJ. Sc. 12 (1822) 40-.
- , new methods. *Weber, W. E.* Gött. Cm. 8 (1832-37) (Ps.) 81-.
- curve of accuracy. *Gallois, F. L. von.* Pogg. A. 116 (1862) 339-.
- dead-beat. *Tait, P. G.* Edinb. R. S. P. 8 (1875) 490-.
- delicate, construction. *Campbell, Jhn.* Calc. J. NH. 2 (1842) 342-.
- , suggestions on use. *Rayleigh, J. W. Strutt (Lord).* B. A. Rp. (1883) 401-.
- for delicate weighing. *Braddock, J.* Madras J. 2 (1835) 86-.
- demonstration-. *Anon.* C. Ztg. 11 (1887) 1396.
- for density determinations. *Roncalli, An.* (xii) Rv. Sc.-Ind. 6 (1874) 67-.
- — —. *Barnard, F. A. P.* Wash. Nat. Ac. Mm. 4 (Pt. 1) (1888) 203-.
- — —, new. *Thore, J.* Dax. S. Borda Bll. (1887) 131-.
- — of gases. *Lux, F.* Fresenius Z. 26 (1887) 38-.
- — —, Lux's. *Anon.* C. N. 58 (1888) 4-.
- — — —, new. *Lux, F.* Fresenius Z. 29 (1890) 13-.
- — —, solids and liquids. *Machado, V.* [1881] Lisb. J. Sc. Mth. 8 (1882) 97-.
- — — liquids. *Westphal, G.* Fresenius Z. 9 (1870) 233-.
- — — minerals and other solids heavier than water. *Parish, R.* Am. J. Sc. 10 (1875) 352-.
- with double suspension. *Douclet, —.* A. Mines 9 (1836) 127-.
- dynamical. *Buquoy, G. von.* Oken Isis (1824) 938-.
- for elementary use. *Linebarger, C. E.* Am. C. S. J. 21 (1899) 31-.

estimation of small excesses of weight by, from time of vibration and angular deflection. *Poynting, J. H.* [1878] *Manch. Lt. Ph. S. Mm.* 7 (1882) 23-.

fish-rod. *Riddell, J. L.* *Silliman J.* 26 (1858) 71.

hydrostatic. *Fabroni, G.* *Siena At. Ac.* 9 (1808) 133-.

— *Barré, J. A.* *Orléans Bll.* 4 (1812) 273-.

— (*Barré*). *Ampère, A. M.* *Par. Bll. S. Encour.* 13 (1813) 77-.

— *Desbordeaux, A.* *Caen Mm. Ac.* (1849) 420-.

— *Buchanan, J. Y.* *D. C. Gs. B.* 4 (1871) 338-.

—, accurate form. *Joly, J.* [1886] *Dubl. S. Sc. P.* 5 (1886-87) 347-.

—, and adjuncts. *Sartorius, F.* *Z. Instk.* 13 (1893) 388-.

—, for densities of liquids. *Autenrieth, O.* *Dingler* 159 (1861) 109-.

—, experimental verification of principle of. *Paquet, É.* *J. de Ps.* 10 (1891) 340-.

—, extremely cheap and delicate. *Ritchie, W.* *Edinb. J. Sc.* 5 (1826) 118-.

—, modifications. *Sartorius, F.* *C. Ztg.* 9 (1885) 1374-.

—, new. *Gerland, B. W.* *S. C. In. J.* 17 (1898) 13.

—, use. *Hirn, G. A.* *A. Gén. Civ.* 2 (1863) (*pte.* 2) 113-, 153-.

*Kuhlmann's.* *Gerland, B. W.* *S. C. In. J.* 14 (1895) 551-.

—, technical. *Gerland, B. W.* *S. C. In. J.* 12 (1893) 995-.

limit of accuracy at present attainable. *Seidel, L.* *Münch. Sb.* (1867) (2) 231-.

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mercury. *Horner, J. K.* *Gilbert A.* 68 (1821) 101-.

for metallurgical purposes. *Rinman, C. (sen.).* *Jern-Kont. A.* 3 (1819) 106-.

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modification. *Mohr, C. F.* *Pogg. A.* 25 (1832) 266-.

*Mohr's*, densities determined by. *Demichel, —.* *A. C. Anal.* 5 (1900) 287-.

—, modification. *Guglielmo, G.* *Rv. Sc.-Ind.* 26 (1894) 177-.

—, —, and apparatus for volume of solids. *Guglielmo, G.* *Rm. R. Ac. Linc. Rd.* 3 (1894) (*Sem.* 2) 299-.

must-, Oechsle, reliability. *Weigelt, C. H.* *C. CB.* 2 (1871) 604-.

new. *Montu, —.* *Par. S. Phlm. Bll.* 1 (1797) 108-.

— *Tralles, J. G.* [1805] *Berl. Ab.* (1804-11) (*Mth.*) 65-.

— *Joule, J. P.* *Manch. Lt. Ph. S. P.* 5 (1866) 145, 165.

— *Mendelejeff, D. I.* *Les Mondes* 36 (1875) 335-.

— (*Mendelejeff's*). *Salleron, J.* *C. R.* 80 (1875) 378-.

— *Jäger, H.* *Carl Rpm.* 13 (1877) 288-.

new. *Kruspér, I.* [1878] (*xii*) *Mag. Tud. Ak. Étk. (Mth.)* 6 (1879) (*No.* 6) 20 pp.; (*x*) *A. Ps. C. Beibl.* 4 (1880) 638-.

— arrangements for. *Bunge, P.* *Z. Instk.* 14 (1894) 131-.

— construction. *Bunge, P.* *Carl Rpm.* 3 (1867) 269-.

—, and its adjustment. *Girgensohn, T.* *St. Pét. Ac. Sc. Bll.* 5 (1839) 177-.

— constructions, *Nemetz's.* *Pensky, B.* *Z. Instk.* 12 (1892) 221-; 14 (1894) 325.

— form (*Roberval*). *Picart, A. C. R.* 96 (1883) 1782-; 97 (1883) 86-, 252.

— *Phillips, H. J.* *C. N.* 72 (1895) 16.

oscillation. *Stamkart, F. J.* *Amst. Vh.* 1 (1849) 63-.

— *Mendelejeff, D.* *R. S. P.* 63 (1898) 454-.

— and equilibrium. *Thiesen, M.* *Par. Poids et Mes. Tr. Mm.* 5 (1886) 40+xxiii pp.

— period, means for reducing. *Verbeek, A.* *Dingler* 304 (1897) 156-.

—, theory. *Anon.* *Dingler* 307 (1898) 225-, 249-.

platform. *Hoffmann, C.* *Pogg. A.* 64 (1845) 317-.

— *Endlweber, J.* *Carl Rpm.* 15 (1879) 607-.

of precision. *Sacré, É.* *Brux. Ac. Bll.* 12 (1845) 17.

— *Arzberger, F.* *Brünn Vh.* 14 (1875) (*Ab.*) 157-.

— *Redon, L.* *As. Fr. C. R.* (1878) 315-.

— *Serrin, V.* *C. R.* 112 (1891) 1299, 1480.

— *Leick, —.* *N.-Vorp. Mt.* 26 (1895) xvi.

—, adjustments and suspensions. *Sauter, A.* *Cztg. Opt.* 15 (1894) 232-.

—, Bunge's, theory. *Bunge, P.* *Cztg. Opt.* 5 (1884) 220-, 229-.

—, construction and adjustment. *Schultze, P.* *Z. Instk.* 12 (1892) 97-.

—, —, verification, *Brauer's* methods. *Lermantov, V. V.* (*xii*) *Rs. C. Ps. S. J.* 9 (*Ps.*) (1877) [*(Pt. 1)*] 326-.

—, direct reading, aperiodic. *Curie, P.* *C. R.* 108 (1889) 663-; *Par. S. Ps. S6.* (1889) 218-.

—, —, —, *Curie's.* *Ledeboer, P. H.* *Lum. Elect.* 36 (1890) 161-.

—, new arrestment. *Lannoy, S. de.* *Z. Instk.* 17 (1897) 261-.

—, —, construction. *Kruspér, I.* [1886] *Mth. Term. Éts.* 5 (1887) 70-; *Mth. Nt. B. Ung.* 5 (1886-87) 1-.

—, optical apparatus for rapid weighing. *Collot, A. C. R.* 112 (1891) 99-.

—, reading arrangement. *Spoerhase, W.* *Z. Instk.* 16 (1896) 167-.

— recent construction, description. *Bunge, P.* *Carl Rpm.* 16 (1880) 372-.

reflection-. *Wartmann, É.* [1841] *Gen. Mm. S. Ps.* 11 (1846) 115-.

— *Grassi, G.* *N. Cim.* 11 (1874) 195-, 217-.

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- Roman (or steel-yard). *Ferroni, P.* Mod. S. It. Mm. 17 (1815) 417-.
- (— — —), ancient. *Commaille, A. J.* Phm. 44 (1863) 490-.
- (— — —), improvements by Paul. *Pictet, M. A. J.* Mines 8 (1797-98) 671-.
- (— — —), micrometric. *Bourcart, R.* [1888] Mulhouse S. In. Bll. 59 (1889) 31-.
- (— — —), modification. *Hassenfratz, J. H.* J. Mines 8 (1798) 683-.
- (— — —), new, report to Bureau Consultatif des Poids et Mesures. *Gathey, —.* J. Mines 8 (1797-98) 691-.
- (— — —) and ordinary, levers used in construction and verification. *Desnanot, —.* Auvergne A. Sc. 26 (1853) 273-.
- (— — —), theory. *Pickel, I.* Münch. D. (1814-15) 83-.
- scientific, construction and use. *Schwirkus, G.* Z. Instk. 7 (1887) 41-, 83-, 412-.
- sensitive and convenient, serving also as magnetometer. *Lampadius, W. A.* Schweigger J. 10 (1814) 171-.
- simple. *Black, Jos.* [1790] Thomson A. Ph. 10 (1825) 52-.
- substitution-. *Lohnstein, T. C.* Ztg. 20 (1896) 572-.
- sources of error. *Hennig, R.* Z. Instk. 5 (1885) 161-.
- spiral. *Cross, C. F.* C. N. 44 (1881) 101-.
- support. *Prony, R. de.* A. C. 36 (1800) 50-.
- tangential, direct reading of densities by. *Zenger, C. W.* [1871] Prag Ab. 5 (1872) 51 pp.
- temperature change in sensitiveness. *Middel, T. A.* Ps. 2 (1900) 115-.
- theory. *Rheinauer, J. A.* Ps. C. 133 (1868) 179-.
- (Rheinauer). *Müller, J. A.* Ps. C. 133 (\*1868) 682-.
- (Müller). *Rheinauer, J. A.* Ps. C. 135 (1868) 335-.
- *Sludskii, T. A.* (xii) Rec. Mth. (Moscou) 4 (1869-70) (Pt. 2) 111-.
- *Aldis, W. S.* [1876] Newcastle C. S. T. 3 (1877) 151-, 161-.
- *Moors, B. P.* N. Arch. Wisk. 12 (1886) 216-.
- and use. *Schönemann, T.* Grunert Arch. 24 (1855) 264-.
- vacuum, Bunge's. *Marek, W.* Par. Poids et Mes. PV. (\*1881) 45-.
- , new. *Kruspér, S.* Z. Instk. 9 (1889) 81-.
- verification and correction. *L'Homme, — de.* Le Puy S. Ag. A. (1828) 174-.
- vibrationless support. *Marek, W.* Z. Instk. 9 (1889) 175-.
- and weighing. *Zech, P.* Carl Rpm. 5 (1869) 102-.
- — —, theory. *Thiesen, M. F.* (xii) Z. Instk. 2 (1882) 358-; 3 (1883) 81-.
- — — and weights. *Schwirkus, G.* (xii) Z. Instk. 1 (1881) 84-, 124; 2 (1882) 310-.
- and weights, etc. *Stas, —.* Par. Poids et Mes. PV. (\*1875-76) 87-.

Apparatus for approximate weighing. *Hase, R.* Cztg. Opt. 19 (1898) 191.

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- Assorter's scale and weighing machine of Madras mint. *Smith, J. T.* Madras Eng. Rp. 2 (1846) 169-.
- Balances and weights, report on those used by the Commission. *Chisholm, H. W. A.* Cons. Arts et Mét. 10 (\*1873) 111-.
- Coins, machine for weighing. *Séguier, A. C.* R. 31 (1850) 188-.
- Gold bullion assay, new method of weighing for. *Foord, G.* [1875] Vict. R. S. T. 12 (1876) 93-.
- Grain, instrument for measuring. (Chondrometer.) *Ovenden, —, & Payne, —.* Nicholson J. 34 (1813) 198-.
- Scale-beam, construction. *Dearborn, B.* Bost. Mm. Am. Ac. 3 (1809) 40-.
- Steelyard, Aristotle's. *Cappelle, J. P. van.* Amst. Ts. Nt. Wet. (1810-11) 305-.
- Weigh-bridge. *Rose, W. N.* Amst. Ts. Ws. Nt. Wet. 1 (1848) 172-.
- — —, Guillaumin's. *Pr.* Dingler 269 (1888) 496-.
- — —, new. *Steinheil, C. A. von.* Wien SB. (1850) (Ab. 2) 398-.
- — —, theory. *Endlweber, J.* Exner Rpm. 21 (1885) 637-.
- — —, and construction. *Mohr, C. F.* Dingler 78 (1840) 195-.
- Weighing machine, compound (basculé), theory. *Moors, B. P.* N. Arch. Wisk. 3 (\*1877) 33-, 97-.
- — —, Quintenz. *E....* Crelle J. 1 (1826) 157-.
- — —, — (or decimal). *Rühlmann, —.* Dingler 132 (1854) 255-.
- — —, —. *Rittershaus, T.* Civing. 21 (1875) 45-.
- — —, theory and description. *Schönemann, T.* Wien D. 8 (1854) (Ab. 2) 1-.
- machines. *Kent, W.* Franklin I. J. 126 (1888) 169-.
- — —, sensibility. *Schönemann, T.* [1852] Wien D. 5 (1853) 157-.
- — —, — (Schönemann). *Ettingshausen, A. von.* Wien Sb. 8 (1852) 442-.
- and recording machine, electrical. *McGarvey, E.* [1900] Sc. Abs. 4 (1901) 5.

## 0140 Numerical values of densities.

(See also Chemistry 7115.)

- Air. *Agamennone, G.* Rm. R. Ac. Linc. Rd. 1 (1885) 111-.
- , liquid, and its components. *Wroblewski, S.* C. R. 102 (1886) 1010-.
- — —, — other liquefied gases. *Ladenburg, A., & Krügel, C.* Berl. B. 32 (1899) 46-, 1415-.
- Alcohol, pure. *Pierre, J. I.* C. R. 76 (1873) 336-.
- , table for dilution of. *Anon.* Manch. Mer. S. T. (1891) 74.
- Animal substances. *Kapff, —, & Schübler, —.* Erdm. J. Tech. C. 14 (1832) 89-.





## 0140 Densities

- Oxygen and nitrogen and hydrogen. *Leduc, A.* C. R. 113 (1891) 186-.
- — — — —, and composition of air. *Leduc, A. J. de Ps.* 1 (1892) 231-.
- — — — —, liquefied. *Cailletet, L., & Hautefeuille, P.* C. R. 92 (1881) 1086-.
- — — — — methane, liquefied. *Olśzewski, K.* *Krk. Ak. (Mt.-Prz.) Rz.* 14 (1886) 181-, 197-; *A. Ps. C.* 31 (1887) 58-.
- Phosphorus vapour. *Dumas, J. B. A. C.* 49 (1882) 210-.
- Platinum. *Hess, H.* St. Pét. Ac. Sc. Mm. 1 (1881) 587-.
- , iridium, and platinum-iridium, physical properties. *Stas, —.* Par. Poids et Mes. PV. (\*1877) 6-.
- metals and alloys, densities and expansions. *Broch, O. J.* Par. Poids et Mes. PV. (\*1877) 209-.
- Saline solutions. *Gerosa, G. G., & Mai, E.* Rm. R. Ac. Linc. Mm. 4 (1887) 134-.
- Salts, various. *Clarke, F. W.* Am. J. Sc. 16 (1878) 199-; *Berl. B.* 12 (1879) 1398-; *Am. C. J.* 5 (1883-84) 240-.
- Selenium. *Schaffgotsch, F. von.* Berl. B. (1847) 422-; *Pogg. A.* 90 (1853) 66-.
- Soda and potash, solutions. *Pickering, S. U.* Ph. Mg. 37 (1894) 359-.
- Sodium chloride, pure. *Unger, U. von.* Erdm. J. Pr. C. 8 (1886) 294-.
- Solids, densities, influence of state of division. *Schiff, H.* C. Ztg. 10 (1886) 430.
- and liquids. *Clarke, F. W.* [1873] (ix) *Smiths. Misc. Col.* 12 (1874) Art. 2, 272 pp.; 32 (1888) Art. 1, xi+409 pp.
- Steam. *Tralles, J. G.* Gilbert A. 27 (1807) 400-.
- *Schmedding, G. J.* Pogg. A. 27 (1883) 40-.
- *Rankine, W. J. M.* Glasg. T. I. Eng. 3 (1859-60) 53-; *Edinb. R. S. T.* 23 (1864) 147-.
- *Schmidt, G.* Dingler 160 (1861) 262-.
- Steel, effect of tempering. *Fromme, C. A.* Ps. C. 8 (1879) 352-.
- , homogeneity. *Gruner, P. A.* Ps. C. 41 (1890) 334-.
- Substances in solid state and in aqueous solution. *Groshans, J. A.* Ph. Mg. 18 (1884) 405-.
- Sulphur vapour. *Biltz, —.* Nt. 38 (1888) 229.
- *Schall, C.* Berl. B. 33 (1900) 484-.
- , and progressive dissociation. *Riecke, E.* Z. Ps. C. 6 (1890) 430-.
- Sulphuric acid, concentrated. *Kohlrausch, W. F. A.* Ps. C. 17 (1882) 69-.
- , dilute, density and composition. *Rücker, A. W.* Ph. Mg. 32 (1891) 304-; 33 (1892) 204-.
- solutions. *Pickering, S. U.* Ph. Mg. 33 (1892) 132-.
- Sulphurous anhydride as liquid and saturated vapour. *Cailletet, —, & Mathias, —.* J. de Ps. 6 (1887) 414-.
- Tellurium. *Lenher, V., & Morgan, J. L. R.* Am. C. S. J. 22 (1900) 28-.

## Measurement of Time; Chronographs 0150

- Vapours at high temperatures. *Sainte-Claire Deville, H., & Troost, L.* A. C. 58 (1860) 257-.
- — — *Bott, W.* B. A. Rp. (1888) 632-.
- — — *Scott, A.* Edinb. R. S. P. 14 (1888) 410-.
- , saturated, and liquefied gases. *Cailletet, L., & Mathias, E.* J. de Ps. 5 (1886) 549-.
- Wood, various kinds. *Karmarsch, K.* Wien Jb. Pol. I. 18 (1834) 120-.
- Woods, principal industrial. *Filippo, P.* Mil. S. It. At. 25 (1882) 105-.
- Zinc vapour. *Mensching, J., & Meyer, V.* Gött. Nr. (1887) 7-.

## 0150 Measurement of time; chronometers.

(See also Astronomy 2100.)

- Absolute measurement by means of gravitational attraction. *Lippmann, G.* C. R. 128 (1899) 1137-.
- unit of time determined by electrical standards. *Lippmann, G.* C. R. 104 (1887) 1070-.
- Chronodeik, for finding time within a second. *Chandler, S. C. (jun.).* Obs. 4 (\*1881) 14-.

## CHRONOGRAPHS. (See also 1650.)

- and application to gun ballistics. *Watkin, (Col.) H.* [1896] R. I. P. 15 (1899) 176-.
- ballistic, Flamache "comparateur-régulateur" for. *Flamache, V.* Lum. Élect. 17 (1885) 583-.
- with centrifugal pendulum. *Rebeur-Paschwitz, E. von.* Z. Instk. 7 (1887) 171-.
- chronographic pendulum, Caspersen's. *Cochard, (Capt.) L.* Rv. Artl. 20 (1882) 535-.
- and chronoscopes, control hammer for. *Külpe, O., & Kirschmann, A.* Ph. Stud. 8 (1893) 145-.
- , — — — (Külpe and Kirschmann). *Wundt, W.* Ph. Stud. 8 (1893) 653-.
- , variable error, and controlling apparatus. *Cattell, McK.* Ph. Stud. 9 (1894) 307-.
- , — — —, — — — (Cattell). *Wundt, W.* Ph. Stud. 9 (1894) 311-.
- with controlling apparatus. *Lange, L.* Ph. Stud. 4 (1888) 457-.
- Duboseq and Mercadier. *Mercadier, E.* Lum. Élect. 4 (\*1881) 404-.
- electric. *Locke, J.* Silliman J. 8 (1849) 231-.
- *Gibbs, W.* Am. As. P. (1854) 103-.
- *Deprez, M.* C. R. 78 (1874) 1427-, 1562-; *Par. S. Ps. Sé.* (1874) 93-.
- , new form. *Smith, (Rev.) F. J.* Ph. Mg. 29 (1890) 377-.
- new. *Dodge, R.* Z. Psychol. 10 (1896) 414-.
- phonograph used as. *Nansouty, M. de.* Gén. Civ. 19 (1891) 343-.
- regulator for. *Anon.* Elekttech. Z. 11 (1890) 88-.
- simple. *Cole, A. D.* Denison Un. Sc. Lb. Bll. 5 (1890) 19-.

simple. *Sanford, E. C.* Am. J. Psychol. 5 (1893) 385-.

spark, Siemens and Halske. *Frölich, O.* (xii) Elekttech. Z. 1 (1880) 346-, 405-.

special. *Lea, H., & Bragge, R.* B. A. Rp. (1894) 757-.

traces, instrument for measuring. *Smith, F. J.* Ph. Mg. 32 (1891) 126-.

with tuning-fork. *Webb, W. L.* Franklin I. J. 134 (1892) 219-.

use of microphone to register swings of pendulum on. *Folie, F.* Brux. Ac. Bil. 13 (1887) 198-.

Watkin. *Ayrton, W. E.* Tel. E. J. 9 (1880) 121-.

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- Arago, D. F. J.* (vi *Adds.*) Par. Bur. Long. An. (1824) 155-.
- Frodsham, W. J., & Parkinson, —.* Silliman J. 29 (1836) 297-.
- Rouyaux, J. A.* Rv. Mar. et Col. 51 (1876) 457-.
- Peters, C. F. W.* [1877] As. Nr. 91 (1878) 155-.
- adjustment for position. *Phillips, É.* C. R. 58 (1864) 287-, 363-.
- balance. *Ellis, R. L.* Camb. Mth. J. 4 (1845) 133-.
- , best form. *Phillips, —.* Cg. Int. Chron. (1889) 13-.
- , isochronism. *Young, C.* Nicholson J. 12 (1805) 56-.
- spring and best escapement. *Rozé, —.* Cg. Int. Chron. (1889) 18-.
- , conical spiral, and other spirals. *Phillips, É.* Par. Éc. Pol. J. Cah. 49 (1881) 1-.
- , gilt. *Dent, E. J.* B. A. Rp. (1841) (pt. 2) 41-.
- , glass. *Dent, E. J.* B. A. Rp. (1833) (pt. 2) 421; 4 (1835) (pt. 2) 595.
- , —, *Arnold, J. R., & Dent, E.* Silliman J. 32 (1837) 330-.
- , spherical spiral. *Phillips, É.* C. R. 88 (1879) 1147-, 1234-.
- , spiral. *Phillips, É.* Par. Mm. Sav. Étr. 18 (1868) 129-.
- , —, new. *Phillips, É.* C. R. 78 (1874) 667-; 86 (1878) 26-.
- , —, non-symmetry of terminal curves. *Rozé, C.* C. R. 73 (1871) 1207-.
- , —, theorem. *Phillips, É.* C. R. 73 (1871) 1131-; 74 (1872) 581-.
- , —, with theoretical terminal curves, in 1877 competition. *Phillips, É.* C. R. 86 (1878) 1479-.
- , —, —, —, —, 7 years observations, Neuchâtel. *Phillips, É.* C. R. 73 (1871) 1069-.
- springs, spiral, isochronism. *Caspari, E.* C. R. 81 (1875) 1122-; 83 (1876) 47-; Par. S. Ps. Sé. (1876) 22-; Cg. Int. Chron. (1889) 89-.
- uncompensated. *Delamarche, —, & Ploix, —.* C. R. 48 (1859) 241-.
- banking balance. *Hardy, W.* Tilloch Ph. Mg. 21 (1805) 181-.
- and clocks. *Bianchi, G.* Tortolini A. 5 (1854) 18-; 6 (1855) 40-.
- and clocks, action of airon regulator. *Jürgensen, U.* Köb. Dn. Vd. Selsk. Afh. 3 (1828) 391-.
- , —, improvements. *Rittenhouse, D.* [1794] Am. Ph. S. T. 4 (1799) 26-.
- , —, rates. *Riddle, E.* [1828] As. S. Mm. 3 (1829) 215-.
- , —, —. *Pagel, L.* [1859] Rech. Chron. Cah. 5 (1861) 289-.
- , —, —. (Pagel). *Ploix, C.* Rech. Chron. Cah. 6 (1862) 375-.
- , —, variation. *Lieussou, A.* Rech. Chron. Cah. 4 (1860) 216-.
- , —, —. (Lieussou). *Laugier, P. A. E.* C. R. 36 (1853) 894-.
- , —, rating. *T.* (vi *Adds.*) Tilloch Ph. Mg. 33 (1809) 402-.
- comparison of times with time at a station. *Fallous, F.* QJ. Sc. 17 (1824) 315-.
- compensation. *Yvon-Villarceau, A. J. F.* Par. A. Obs. 7 (1863) 1-.
- , *Rozé, C.* C. R. 90 (1880) 807-, 858-.
- , *Cellérier, G.* Gen. S. Ps. Mm. 29 (1884-87) No. 6, 45 pp.
- , *Phillips, —.* Cg. Int. Chron. (1889) 62-; C. R. 109 (1889) 489-.
- balance. *Hardy, W.* Nicholson J. 16 (1807) 120-.
- , effect of elasticity. *Phillips, É.* C. R. 67 (1868) 508-.
- , regulation. *Sang, E.* [1888] So. S. Arts. T. 12 (1891) 183-.
- , Winnerl's. *Caspari, E.* C. R. 82 (1876) 894-.
- construction and regulation. *Rozé, C.* Cg. Int. Chron. (1889) 105-.
- determination of constants. *Pugibet, (le lt.) H.* Rv. Mar. et Col. 131 (1896) 477-.
- diurnal variations. *Bouquet de la Grye, —.* Cg. Int. Chron. (1889) 25-.
- electric. *Graffigny, H. de.* Lum. Élect. 46 (1892) 66-, 321-, 572-, 618-.
- electrolytic. *Parragh, G.* Term. Közl. 20 (1888) (Suppl.) 139-; Mth. Nt. B. Ung. 6 (1889) 415-.
- errors, and new compensation balance. *Dent, E. J.* Silliman J. 45 (1843) 83-.
- without fusee. *Saunier, —.* Cg. Int. Chron. (1889) 27-.
- improvements. *Mathew, D. D.* Nicholson J. 20 (1808) 224-.
- , *Yvon-Villarceau, A. J. F.* C. R. 82 (1876) 531-, 580-.
- indicating  $\frac{1}{1000}$  second. *Schmidt, W.* Par. S. Ps. Sé. (1890) 243-.
- influence of atmospheric moisture. *Tennant, (Maj.-Gen.) J. F.* As. S. M. Not. 44 (1884) 22-, 73-.
- , —, —. *Peters, C. F. W.* A. der Hydrog. 15 (1887) 505-.
- , —, pressure. *Harvey, G.* Phil. Trans. (1824) 372-.
- , —, —. *Yvon-Villarceau, A. J. F.* C. R. 82 (1876) 697-.
- , —, —. *Hilfiker, J.* As. Nr. 120 (1889) 109-; 122 (1889) 343-; Neuch. S. Sc. Bil. 17 (1889) 3-.
- , —, earth's magnetic field. *Cornu, A. C.* R. 131 (1900) 859-.



influence of induced magnetism of iron shell.

Harvey, G. [1824] QJ. Sc. 18 (1825) 34-  
— magnetism. Lccount, P. Edinb. Ph. J.  
6 (1822) 238-.

— Harvey, G. [1823-24] Edinb. Ph.  
J. 10 (1824) 1-, 342-; QJ. Sc. 17 (1824) 197-.

— Piddington, H. Beng. J. As. S. 20  
(1851) 61-.

— Boeddicker, O. [1882] Dubl. S. Sc.  
T. 3 (\*1883-87) 1-.

— Le Goarant de Tromelin, (le lt.)  
G. Rv. Mar. et Col. 88 (1886) 5-.

— of balance. Scoresby, (Rev.) W.  
[1822] Edinb. R. S. T. (1823) 353-.

— ships. Delamarche, —, & Ploix,  
— C. R. 48 (1859) 462-; Reh. Chron.  
(1862) (pte. 6) 389-.

— mode of suspension. Thomson, (Sir) W.  
Glasg. T. I. Eng. 10 (1867) 139-.

— proximity of masses of iron. Barlow, P.  
Phil. Trans. (1821) 361-.

— shocks on balance. Antoine, —. Cg.  
Int. Chron. (1889) 10-.

magnetic intensity, case. Harvey, G. [1823]  
Edinb. R. S. T. 10 (1826) 117-.

main springs, experimental researches. Resal,  
H. A. Mines 12 (1867) 93-.

—, simplified formulæ relating to. Resal,  
H. A. Mines 13 (1868) 301-.

marine, competitions for, conditions. Rollet  
de L'Isle, —. Cg. Int. Chron. (1889) 137-.

—, Dutch navy. Kaiser, P. J. Cg. Int.  
Chron. (1889) 146-.

—, with electrical record. Hirsch, A. Neuch.  
Bll. 7 (pt. 2) (1866) 431-.

—, French Navy, history and report. Rollet de  
L'Isle, —. Rv. Mar. et Col. 99 (1888) 324-  
480-.

—, Grandjean's. Hirsch, A. Neuch. Bll. 6  
(1861-63) 387-.

—, history and development. Gardner, H. D.  
[1890] Un. Serv. I. J. 34 (1890-91) 313-.

—, influence of atmospheric moisture. Anon.  
A. der Hydrog. 17 (1889) 107-.

—, iron. Fisher, G. Phil. Trans. (1820)  
196-.

—, observations during voyage of "La Caprici-  
euse." Mouchez, E. Reh. Chron. (1855)  
1-.

—, — voyages of the "Isis" and "Iphi-  
génie." Martin, (Lt.) A. Rv. Mar. et Col.  
45 (1875) 385-.

—, protection. Belli, G. N. Cim. 5 (1857)  
459-.

—, use. Firminger, T. Tilloch Ph. Mg. 42  
(1813) 241-.

—, Givry, —. [1840] Reh. Chron. Cah.  
2 (1859) 73-.

—, (de Magnac). Yvon-Villarcéau, A. C.  
R. 75 (1872) 897-.

—, Magnac, [H.] de. C. R. 77 (1873)  
609-.

—, and their variation. Magnac, A. de. Cg.  
Int. Chron. (1889) 155-.

—, — Mouchez, E. Cg. Int. Chron.  
(1889) 160-.

—, various. Urban, L. As. Nr. 53 (1860)  
241-.

marine, and watches, influence of tempera-  
ture. Birkenmajer, L. Krk. Ak. (Mt.-Prz.)  
Rz. 10 (1896) 357-; Crc. Ac. Sc. Bll. (1896)  
78-.

pivots, purifying olive oil for. Walker, E.  
Tilloch Ph. Mg. 36 (1810) 372-.

rate, microphonic registration. Berget, A. C. R.  
129 (1899) 712-.

— in rarefied air. Jürgensen, U. Kiøb. Dn.  
Vd. Selsk. Afh. 4 (1829) xxiv-.

rates, comparative. Bond, W. C. (vi Add.)  
Bost. Mm. Am. Ac. 1 (1833) 84-.

—, comparison. Epps, J. [1832] As. S. Mm.  
6 (1833) 119-.

—, predetermination. Børgen, —. A. der  
Hydrog. 15 (1887) 31-.

—, sea. Toynbee, H. As. S. M. Not. 9  
(1848-49) 172-.

—, and land. Mudge, W. Edinb. Ph. J. 5  
(1821) 378-.

—, —, —, Frodsham, W. J., & Parkinson,  
— Silliman J. 26 (1834) 121-.

rating. Epps, J. As. S. M. Not. 2 (1831-33)  
124-.

—, Daussy, P. [1835-40] Reh. Chron. Cah.  
2 (1859) 43-; Con. des Temps (1843) 69-.

—, Hartnup, J. As. S. M. Not. 23 (1863)  
170-; Nt. 8 (1873) 394-.

—, Magnac, H. J. A. de. C. R. 81 (1875)  
715-.

—, Faye, H. A. É. C. R. 88 (1879) 1143-  
1291-.

—, by signals. Wauchope, R. Edinb. N. Ph.  
J. 8 (1830) 160-, 289-.

regulation, and synchronising clocks. Cornu,  
A. Cg. Int. Chron. (1889) 176-.

for small time intervals. Negro, S. dal. Pa-  
dova N. Sag. 1 (1817) 127-.

—, Breguet, A. L. Edinb. Ph. J. 1  
(1819) 323-.

—, —, —, Barré, —. Lille Tr. (1819-22)  
1-.

—, —, —, (Barré's). Delisle, —. Lille Tr.  
(1819-22) 34-.

—, —, —, Bellavitis, G. Ven. At. 5 (1846)  
282-.

temperature coefficients. (Chronometer testing  
conference.) Stechert, C. A. der Hydrog.  
24 (1896) 348-; 25 (1897) 330-.

—, —, —, Heuer, K., & Reinicke,  
(Kapt.) G. A. der Hydrog. 26 (1898) 262-.

—, —, —, calculation. Stechert, C. A. der Hy-  
drog. 23 (1895) 388-.

—, —, —, variation. Børgen, —. A. der Hydrog.  
11 (\*1883) 401-.

—, —, —, compensation. Phillips, É. C. R. 90  
(1880) 483-, 561-, 649-.

—, —, —, effect of form of balance. Phillips, É.  
C. R. 66 (1868) 526-.

—, —, —, correction and temperature coefficients.  
Anon. A. der Hydrog. 19 (1891) 27-.

—, —, —, use. Esenbeck, (Kapt.) N. von. A. der  
Hydrog. 17 (1889) 149-.

—, —, —, corrections. Nevins, A. E. [1874-76] As.  
S. M. Not. 35 (1875) 79-; Lpoul. Lt. Ph. S.  
P. 30 (1876) 227-.

—, —, —, Hartnup, J. As. S. M. Not. 35 (1875)  
314-.



temperature influence. (Memoirs, 1831, '32, '42, '44.) *Cornulier*, — *de*. *Rech. Chron. Cah.* 2 (1859) 87-; *Cah.* 3 (1859) 109-.

— — *Börger*, —. *A. der Hydrog.* 6 (\*1878) 489-.

testing. *Hartnup*, *J.* *Lanc. T. Hist. S.* 9 (1857) 11-; *R. S. P.* 14 (1865) 548-.

—, *Greenwich*, 1823. *Hutton*, *G. F.* *Tilloch Ph. Mg.* 61 (1823) 177-.

—, — and elsewhere. *Caspari*, —. *Cg. Int. Chron.* (1889) 23-.

—, *Kiel Observatory*. *Peters*, *C. F. W.* *A. der Hydrog.* 3 (\*1875) 343-.

tests of various kinds, recent. *Gelcich*, *E. Z. Instk.* 13 (1893) 343-.

variation. *Haley*, *J.* *Nicholson J.* 8 (1804) 46-.

—, and amplitude of vibration. *Nyren*, —. *Cg. Int. Chron.* (1889) 153-.

— — regulation. *Caspari*, *E.* *Cg. Int. Chron.* (1889) 67-.

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## CHRONOSCOPES.

*Benzenberg*, *J. F.* *Voigt Mg.* 12 (1806) 181-.

electrochemical. *Hessler*, *F.* (vi *Adds.*) *D. Nt. Vsm. B.* 34 (1858) 156-.

experiments. *Hirsch*, *A.* (vi *Adds.*) *Sch. Gs. Vh.* 46 (1862) 215-.

gravitational, correction for resistance of air. *Leroux*, *F. P.* *A. C.* 12 (1867) 396-, 404-.

improvement. *Glasener*, *M.* *C. R.* 43 (1856) 814-.

method of marking by electric spark. *Leroux*, *F. P.* *C. R.* 55 (1862) 839-.

pendulum, accessory apparatus. *Noyes*, *W.* [1890] *Am. J. Psychol.* 3 (1891) 367-.

—, and accessory apparatus. *Scripture*, *E. W.* *B. A. Rp.* (1897) 824.

simple. *Sanford*, *E. C.* [1890] *Am. J. Psychol.* 3 (1891) 174-.

*Vernier*. *Sanford*, *E. C.* *Am. J. Psychol.* 9 (1897-98) 191-.

vibration-. *Müller*, *Hub.* *Sch. Nt. Gs. Vh.* 52 (1868) 27-.

—, *Müller*, *Joh.* *A. Ps. C.* 139 (1870) 504-.

—, electric. *Beetz*, *W.* *A. Ps. C.* 135 (1868) 126-.

—, and experiments. *Müller*, *Joh.* [1868] *A. Ps. C.* 136 (1869) 151-.

Clock- and instrument-makers, oil used by, improved preparation. *Moll*, *G.* *Hall Bij.* 1 (1826) 1-.

— making. *Roussel*, *M.* *Amiens Mm. Ac. Sc.* (1841) 127-.

— —, application of mechanics. *Resal*, *H.* *A. Mines* 10 (1866) 423-; 11 (1867) 207-; 15 (1869) 211-; 18 (1870) 317-.

— —, toothed wheels. *Isely*, (Prof.) —. *Neuch. Bil.* 9 (1873) 381-.

Clock-work for continuous uniform motion. *Jacobi*, *M. H.* [1846] *St. Pét. Ac. Sc. Bil.* 6 (1848) 104-.

— — — — —. *Wagner*, *J.* *C. R.* 29 (1849) 701.

Clock-work, electric. *Zetsche*, —. *Elekttech. Z.* 5 (1884) 126-.

— — at Exhibition of 1889, machinery in manufacture. *Garnier*, *P.* *Cg. Int. Chron.* (1889) 38-.

## CLOCKS.

*Bessel*, *F. W.* *B. A. Rp.* (1842) (pt. 2) 1-; *As. Nr.* 20 (1843) 137-.

*Förster*, *W.* *As. Nr.* 91 (1878) 337-, 353-, 369-.

in air-tight case. *Förster*, *W.* *Carl Rpm.* 3 (1867) 271-.

alteration of arcs by hygrometrical changes of the air; and a compensating pendulum of deal. *Squire*, *T.* *Tilloch Ph. Mg.* 65 (1825) 38-.

astronomical. *Cesaris*, *G. A. de*. *Mil. Effem. As.* (1814) 74-.

—, *Hirsch*, *A.* *Neuch. Bil.* 5 (1859-61) 461-.

—, *Newcomb*, *S.* *Sid. Mess.* 3 (1884) 206-.

—, equalisation of arcs. *Jürgensen*, *U.* *Kiöb. Dn. Vd. Selsk. Afh.* 1 (1824) 209-.

—, *Innsbruck*. *Czermak*, *P.* *Innsb. Nt. Md. B.* 24 (1899) 193-.

—, new. *Boys*, *C. V.* [1877] *As. S. M. Not.* 38 (1878) 74-.

—, with pendulum governor. *Thomson*, (Sir) *W.* *R. S. P.* 17 (1869) 468-.

—, regulation. *Hansteen*, *C.* *N. Mg. Ntvd.* 6 (1851) 30-.

and atmospheric pressure. *Bessel*, *F. W.* *As. Nr.* 2 (1824) 49-.

— — —. *Robinson*, *T. R.* *As. S. Mm.* 5 (1833) 125-.

— — —. *Förster*, *W.* *Berl. Mb.* (1867) 239-.

— — —. *Hipp*, *M.* [1877] *Neuch. S. Sc. Bil.* 11 (1879) 152-, 159-.

atmospheric pressure compensation. *Carlini*, *F.* *Brugnatelli G.* 8 (1825) 338-.

— — —. *Robinson*, *T. R.* *B. A. Rp.* (1843) (pt. 2) 17-, 102.

— — —. *Krüger*, *A.* *As. Nr.* 62 (1864) 279-; 68 (1867) 327-.

— — —. *Airy*, (Sir) *G. B.* *Ph. Mg.* 41 (1871) 482.

— — —. *Denison*, *E. B.* *As. S. M. Not.* 33 (1873) 122-, 294-.

— — — (Denison's). *Robinson*, *T. R.* *As. S. M. Not.* 33 (1873) 295-.

— — —. *Redier*, *A.* *C. R.* 83 (1876) 1174-.

— — —. *Gulbransen*, *P. F.* *Belfast NH. S. Rp. & P.* (1890-91) 87-.

— — error. *Webster*, *R.* *As. S. M. Not.* 33 (1873) 296-.

*Breguet's*. *Arago*, *D. F. J.* (vi *Adds.*) *Par. Bur. Long. An.* (1824) 152-.

at Buda-Pest Polytechnic. *Kruspér*, *I.* [1885] *Mth. Term. Ét.* 4 (1886) 19-; *Mth. Nt. B. Ung.* 4 (1885-86) 18-.

chronometric alarum. *Bianchedi*, *G.* (xii) *Rv. Sc.-Ind.* 6 (1874) 92-.

church-, illumination. *Bryson*, *R.* *Edinb. N. Ph. J.* 33 (1842) 293-.

comparison, electric. *Ceraski*, *W.* *Mosc. Obs.* A. 3 (Pt. 2) (1896) 123-.

## Compensation pendulum.

- Crosthwaite, J.* [1787] *Ir. Ac. T.* 2 (1788) 7-.
- Döhler, J. F. A.* *Gilbert A.* 7 (1801) 318-.
- Benzenberg, J. F.* *Voigt Mg.* 4 (1802) 697-.
- Kater, H.* *Nicholson J.* 20 (1808) 214-.
- Ward, H.* *Nicholson J.* 21 (1808) 53-.
- B., R.* *Nicholson J.* 33 (1812) 217-.
- Reid, A. A. C.* 85 (1813) 183-.
- Ermerins, J. G.* *Leijd. A. Ac.* (1818-19) 22 pp.
- Hill, C. J. D.* (vi. *Adds.*) *Lund. Phys. Sällsk.* Årsb. (1823) 77-.
- Berlinger, I.* *Wien Jb. Pol. I.* 6 (1825) 14-.
- Zecchini-Leonelli, —.* *Wien Jb. Pol. I.* 6 (1825) 53-.
- Herapath, W.* *Tilloch Ph. Mg.* 65 (1825) 374-.
- Krajenhoff, H. E.* *Hall Bij.* 7 (1832) 351-.
- Forman, W.* *Dingler* 55 (1835) 331-.
- Jones, W. G.* *Silliman J.* 38 (1840) 274-.
- Meikle, H.* *Edinb. N. Ph. J.* 41 (1846) 385-.
- Laugier, P. A. E.* *C. R.* 25 (1847) 415-.
- Smith, J. L. C.* *R. 83* (1876) 202; *Am. J. Sc.* 12 (1876) 106-.
- Weber, R.* *Neuch. S. Sc. Bil.* 15 (1886) 169-.
- Nippoldt, W. A.* *Z. Instk.* 16 (1896) 44-.
- Butenschön, G.* *Cztg. Opt.* 18 (1897) 61.
- application of property of circle in construction.
- Giulio, C. I.* [1848] *Tor. Mm. Ac.* 11 (1851) 187-.
- Baily's, Bryson, R.* *Edinb. N. Ph. J.* 38 (1845) 220-.
- compound, of steel and zinc. *Lowe, E. J.* *Manch. Ph. S. P.* 1 (1857-60) 218-.
- Graham's, Dienger, J.* *Grunert Arch.* 9 (1847) 338-.
- gridiron. *Benzenberg, J. F.* *Gilbert A.* 14 (1803) 315-.
- , of lead and iron. *Benzenberg, J. F.* *Voigt Mg.* 4 (1802) 787-.
- , new. *Nicholson, W.* *Nicholson J.* 3 (1800) 205-.
- height of mercury. *Lorenzoni, G.* *Spet. It.* Mm. 8 (1879) (*App.*) 1-.
- mathematical rules for construction. *Stevally, J. B. A. Rp.* (1836) (*pt. 2*) 7-.
- mercury. *Blacker, T.* [1806] *Bode As. Jb.* (1810) 221-.
- (*Lowe's*). *Firminger, T.* *Tilloch Ph. Mg.* 54 (1819) 102-.
- , *Baily, F.* *As. S. Mm.* 1 (1822) 381-.
- , *Encke, J. F.* *As. Nr.* 10 (1833) 119-.
- , *Böhm, J. G.* *Wien SB.* 26 (1857) 345-.
- , *Balázs, M.* *Termt. Közl.* 25 (1893) (*Suppl.*) 47-.
- , *Riefler, S.* *Z. Instk.* 13 (1893) 88-.
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- of 2 pieces. *Sang, E.* [1867] *Edinb. R. S. P.* 6 (1869) 67-.
- simplest. *Huth, G.* *Bode As. Jb.* (1803) 213-.
- for temperature. *Nicholson, W.* *Nicholson J.* 1 (1797) 56-.
- and atmospheric pressure. *Sang, E.* [1870] *Edinb. T. Sc. S. Arts* 8 (1872) 163-.
- — — — — *Oudemans, J. A. C.* *As. Nr.* 100 (1881) 17-.
- — — — — *Nippoldt, W. A.* *Z. Instk.* 9 (1889) 197-.
- zinc and steel, *versus* mercurial. *Buckney, T.* *As. S. M. Not.* 46 (1886) 462-.
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- contact, new. *Braun, K.* (xn) *Mth. Term. Éts.* 1 (1883) 151-; *Mth. Nt. B. Ung.* 1 (1882-83) 119-.
- contact-maker, electric. *Grubb, H.* [1878] *Dubl. S. Sc. P.* 2 (1880) 115-.
- continuous motion, regulators for. *Leroux, F. P.* *Par. A. Cons.* 7 (1867) 595-.
- control, electric. *Hartnup, J.* *B. A. Rp.* (1857) (*pt. 2*) 13, 180-.
- , —, *Walker, C. V.* *As. S. M. Not.* 21 (1861) 72-, 160-.
- for Copenhagen University. *Jürgensen, U.* *As. Nr.* 3 (1825) 1-.
- correction by means of telephone. *Nordenskiöld, N. K.* *Stockh. Ofv.* 40 (1883) No. 4, 49-.
- with dead-beat escapement and deal pendulum, semi-arcs of vibration. *Squire, T.* *Ph. Mg.* 2 (1827) 34-.
- diminution of friction. *Massey, E.* *Tilloch Ph. Mg.* 18 (1804) 305-.
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- , *Jaspard, J.* *Brux. Ac. Bil.* 20 (1853) (*pte. 3*) 281-.
- , *Jacobi, M. H.* [1856] *St. Pét. Ac. Sc. Bil.* 15 (1857) 25-.
- , *Barnard, F. A. P.* *Am. As. P.* (1858) 17-.
- , *Hirsch, A.* *Neuch. Bil.* 5 (1859-61) 591-.
- , *Cauderay, H.* *Laus. Bil. S. Vd.* 8 (1864-65) 246.
- , *Thomson, (Sir) W.* [1866] *Glasg. Ph. S. P.* 6 (1868) 61-.
- , *Arzberger, F.* *Brünn Vh.* 8 (1869) (*Ab.*) 91-; 9 (1870) (*Ab.*) 33-.
- , *Butkevich, F. S.* [1870] (xn) *Mosc. S. Sc. Bil.* 39 [No. 2] (1880) 11-.
- , *Brunn, J.* *A. Ps. C.* 157 (1876) 411-.
- , *Dumoulin-Froment, P.* *A. Tél.* 3 (1876) 345-.
- , *Gardner, H. D.* *Nt.* 20 (1879) 345-.
- , *Williot, —.* [1881] *Rv. Sc.* 2 (1882) 417-.
- , *Arzberger, F.* (xn) *Z. Instk.* 2 (1882) 51-.
- , *Magneville, — de.* *Lum. Élect.* 10 (\*1883) 244-.
- , *Hirsch, A.* *Neuch. S. Sc. Bil.* 14 (1884) 1-.
- , *Mauritius, —.* *Exner Rpm.* 20 (1884) 815-.
- , *Sartiaux, E.* *Lum. Élect.* 11 (1884) 91-.
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- , *Favarger, A.* *Gén. Civ.* 12 (1887-88) 330-, 338-.
- , *Hirsch, A.* *Neuch. S. Sc. Bil.* 19 (1891) 3-.
- , *Braun, L.* [1894] *Gén. Civ.* 26 (1894-95) 3-.
- , *Sellaroli, A.* *Rv. Sc.-Ind.* 32 (1900) 206.
- , *Berlin. Kramer, A.* *Dingler* 121 (1851) 111-.

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- , Kleisner's. Zetzsche, E. Lum. Elect. 31 (1889) 419-.
- , Paris Exhibition, 1881. Du Moncel, T. Lum. Elect. 4 (\*1881) 337-.
- , Philadelphia Exhibition. Napoli, D. Lum. Elect. 16 (1885) 314-.
- , Řebiček's. Waltenhofen, A. von. [1879] Prag Ab. 10 (1881) (Mth.) (No. 2) 6 pp.
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- , —. Anon. Tel. J. 15 (1884) 243-.
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- temperature compensation. Ronalds, (Sir) F. Tilloch Ph. Mg. 46 (1815) 203-.
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- — — — — K., H. Nicholson J. 34 (1813) 146-.
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- luni-solar attraction. Gaillot, A. Bil. As. 1 (1884) 217-; C. R. 98 (1884) 893-.
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- — — Brioschi, C. Mil. Effem. As. (1812) 114-.
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- , advantages of small arc. Sang, E. Edinb. N. Ph. J. 15 (1833) 137-.
- amplitude. Walker, Ez. Nicholson J. 2 (1802) 76-, 273-.
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- , —. Clausen, T. Crelle J. 5 (1829) 314-.
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- , Galileo's. Schalk, W. C. L. van. Z. Instk. 7 (1887) 350-, 428.
- , Harris's, erected in 1641; and rate of 2 clocks. Reid, T. Tilloch Ph. Mg. 45 (1815) 178-.
- , Huygens as inventor of. Swinden, J. H. van. Anst. Vh. 3 (1817) 27-; Edinb. Ph. J. 6 (1822) 197-; 7 (1822) 35-.
- , invention. Wolf, R. Zür. Vjschr. 32 (1887) 9-.
- conical. Foucault, L. C. R. 25 (1847) 154-.
- , electrically maintained. Féry, C. C. R. 130 (1900) 1248-; As. Fr. C. R. (1900) (Pt. 2) 467-.
- , —, Campiche. Dary, G. [1900] Sc. Abs. 4 (1901) 95-.
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- , motion of support caused by. Desforges, (le comm.). Cg. Int. Chron. (1889) 191-.
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- wood. Bailly, F. Tilloch Ph. Mg. 65 (1825) 41-.
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- , Troughton's. Schnitter, W. [1807] Bode As. Jb. (1810) 184-.
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- , — (Boswell). *G., J.* Nicholson J. 15 (1806) 84-.
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- , in partial vacuum. *Carrington, R. C.* [1872] As. S. M. Not. 33 (1873) 51-.
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- , electric. *Ritchie, F. J.* [1878] Sc. S. Arts T. 10 (1883) 30-.
- , —. *Anon.* A. Tél. 16 (1889) 348-.
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- , —, —, —, mechanical production. *Rodanet, A. H.* Cg. Int. Chron. (1889) 59-.
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- , —, maintaining power. *Nicholson, W.* Nicholson J. 1 (1797) 429-; 2 (1799) 49-.
- , pendulums and balances of, disturbance; theory of escapements. *Airy, G. B.* [1826] Camb. Ph. S. T. 3 (1830) 105-.
- , —, —, —, influence of gravity. *X.* Nicholson J. 22 (1809) 134-.
- , repeating. *Elliot, J. M.* Nicholson J. 7 (1804) 157-.
- , —, 50 years progress. *Gardner, H. D.* Nt. 36 (1887) 392-, 484-.
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- , universal. *Böhm, J. G.* Prag Sb. (1862) 57-.
- , wooden suspension, Alps and Pyrenees. *Stanley, O.* Edinb. N. Ph. J. 11 (1831) 281-.
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- , —, new. *Whitelaw, D.* Edinb. Ph. J. 8 (1823) 27-.
- , —, —. *Airy, G. B.* As. S. M. Not. 5 (1839-43) 221-.
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- , —, —. (Appel). *Westphal, A.* Z. Instk. 12 (1892) 164-.
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- , —, —. *Riefler, S.* As. Nr. 134 (1894) 217-; Z. Instk. 14 (1894) 346-.
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- , —, detached. *Young, C. A.* Spet. It. Mm. 6 (1877) (App.) 73-.
- , of "Hipp" chronograph, and measurement of small intervals of time. *Briggs, R.* Franklin I. J. 73 (1877) 89-.
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- , clock-. *Wagner, J.* Par. Bll. S. Encour. 46 (1847) 3-.
- , —. *Denison, E. B.* [1848] Camb. Ph. S. T. 8 (1849) 633-.
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- , —, precision-, Neuchâtel Observatory. *Favarger, A.* Lum. Elect. 20 (1886) 206-.
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- , Helmholtz, modification. *Kleiner, A.* Arch. Sc. Ps. Nt. 8 (1899) 375-.
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- , —, apparatus. *Aldini, G.* Bb. Un. 51 (1832) 77-.
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- , —, elliptic, Dijon, 1827. *Perret, A.* N. A. Mth. 15 (1856) 399-.
- , —, —, —. *Dumay, —.* [1899] Dijon Ac. Sc. Mm. 7 (1901) xix-.
- , new. *Decohorne, —.* C. R. 113 (1891) 481.
- , portable. *Viala, E.* Mntp. Ac. Sc. Mm. 5 (1861-63) 155-.
- , — (Sonnenring). *Karsten, G.* [1893] Schl.-Holst. Nt. Vr. Schr. 10 (1895) 66-.
- , universal, Sharp's. *Robinson, T. R. B. A.* Rp. (1849) (pt. 2) 34.
- Sundials. *Littrow, J. J. von.* Baumgartner Z. 9 (1831) 148-.
- , adjustment. *Patterson, R.* [1817] Am. Ph. S. T. 1 (1818) 333-.
- , construction. *Francaeur, L. B.* Gergonne A. Mth. 8 (1817-18) 233-; 9 (1818-19) 91-.
- , —, graphical. *Kahrer, G.* Wien Jbr. Ober-Realsh. Inn. Stadt 5 (1863) 1-.

- Sundials, construction, new method. *Servier*, —. Rv. Sc. 49 (1892) 366-.
- , globes for. *Avit*, —. Le Puy A. S. Ag. (1827) 189-.
- Telechronometer. *Ungerer*, —. Cg. Int. Chron. (1889) 189-.
- Telephonic time-transmitter. *Harrington*, M. W. Science 1 (\*1883) 302-.
- Temperature and time, measurement, analogy. *Macgregor*, J. G. [1887] N. Scotia I. Sc. P. & T. 7 (1890) 20-.
- Time determination in study of relative gravitation. *Saija*, G. Spet. It. Mm. 28 (1900) 65-.
- signals, correction of errors in distribution. *Grubb*, (Sir) H. [1898] Dubl. S. Sc. P. 9 (1899-1902) 37-.
- , electric. *Carhart*, H. S. Science 3 (1884) 401.
- , —, method of making. *Mell*, P. H. (jun.) Science 2 (\*1883) 823.
- , —, —, —, —, M. Science 3 (1884) 59.
- , —, —, telegraphy. *Hirsch*, A. Neuch. Bll. 6 (1861-63) 373-.
- Watch, rocking, rates of, and gravitational pendulum. *Barus*, C. Ph. Mg. 50 (1900) 595-.
- Watches, compensation curb. *Scott*, J. Nicholson J. 11 (1805) 19-.
- , —, *Hardy*, W. Nicholson J. 20 (1808) 138-.
- , magnetized. *Lewis*, W. T. Franklin I. J. 143 (1897) 60-.
- , mainspring, theory. *Young*, Alex. Franklin I. J. 24 (1852) 344-.
- , Paillard palladium alloys in. *Houston*, E. J. Am. Ph. S. P. 25 (1888) 129-.
- , Paillard's non-magnetic balance and hairspring. *Houston*, E. J. Franklin I. J. 125 (1888) 238-.
- and other time-pieces, influence of magnetism. *Varley*, S. Tilloch Ph. Mg. 1 (1798) 16-.
- , trains. *Pearson*, W. Nicholson J. 5 (1802) 46-.

## 0160 Measurement of velocity, acceleration, energy of visible motion.

### MEASUREMENT OF VELOCITY.

- Aerostat, apparatus for. *Leloup*, J. Aér. (1896) 123-.
- Apparent motions of objects. *Van Dyck*, F. C. (xii) Am. Mer. J. 3 (1882) 72-.
- Cycles. *Guérin*, V. Rv. Sc. 42 (1888) 112-.
- Difficulties in calculation. *Denny*, W. Glasg. I. Eng. T. 18 (1875) 193-.
- Electric sparks, photography by, application. *Hermite*, G. C. R. 106 (1888) 561-.
- Engineering purposes, measurement for. [*Hele*] *Shaw*, H. S. I. CE. P. 69 (1882) 364-.
- Explosive waves, chronographic measurements of velocity. *Smith*, F. J. R. S. P. 45 (1889) 451-.
- Indicating and recording apparatus, theory. *Hele Shaw*, H. S. [1884] Bristol Nt. S. P. 4 (1885) 130-.
- Indicator of velocity and distance, by resistance of air. (Velodometer.) *La Valette*, H. de. Gén. Civ. 27 (1895) 11-.
- Intermittent light, use in measuring rapid motions. *Hermite*, G. C. R. 103 (1886) 412-.
- Kinemometer. *Jacquemier*, R. Rv. Mar. et Col. 58 (1878) 265-; 94 (1887) 351-.
- Pendulum, application. *Boucheporn*, —. C. R. 36 (1853) 831-.
- movements, velocity recorder in. *Lecarme*, J., & *Lecarme*, L. C. R. 124 (1897) 356.
- Photographic analysis of movements. *Marey*, —. J. de Ps. 3 (1884) 199-.
- methods. *Heun*, K. Z. Mth. Ps. 44 (1899) 18-.
- Pumping-engine velocity diagrams. *Baird*, D. Fed. I. Mn. E. T. 9 (1895) 138-.
- Rapid movements, especially periodic, observation. *Plateau*, J. A. F. Brux. Ac. Bll. 6 (1883) 484-.
- Recorder, new, and application to anemometry. *Griffiths*, J. A. N. S. W. R. S. J. 28 (1894) 281-.

### ROTATION VELOCITY.

- Dolbear*, A. E. Am. J. Sc. 3 (1872) 248-.
- Schuller*, A. A. Ps. C. 146 (1872) 497-.
- Clarke*, G. S., & *McLeod*, H. R. S. P. 26 (1878) 157-.
- Jones*, J. V. Card. Nt. S. T. 20 (1889) 30.
- by centrifugal speed gauge. *Prytz*, K. Z. Instk. 11 (1891) 389-.
- counter, differential, mechanism and use. *Valessie*, —. C. R. 86 (1878) 1116-.
- , —, *Valessie*'s (report). *Dupuy de Lôme*, —. C. R. 86 (1878) 1364-.
- , —, —, *Jourdan*, L. [1881] Rv. Mar. et Col. 74 (1882) 55-.
- , for motors. *Gérard*, A. Brux. Ac. Bll. 47 (1879) 47-.
- of disks, etc. *Werner*, —. Berl. Pol. Gs. Vh. 22 (1861) 127-.
- indicator. *Benardi*, E. Ven. I. At. 6 (1880) 773-.
- , *Lambinet*, —. Rv. Mar. et Col. 81 (1884) 379-.
- , *Samson*, (le lt.) G. Rv. Mar. et Col. 116 (1893) 39-.
- , *Amster*, A. Arch. Sc. Ps. Nt. 32 (1894) 291-.
- , *Tétot*, V. Rv. Mar. et Col. 128 (1896) 434-.
- , electric. *Anon*. Tel. J. 15 (1884) 469.
- , —, *Dary*, G. Sc. Abs. 1 (1898) 673.
- , —, *Browne*, W. H. (jun.) Sc. Abs. 2 (1899) 432.
- , electromagnetic. *Claude*, G. Sc. Abs. 1 (1898) 97-.
- , magnetic. *Deprez*, M. Lum. Elect. 3 (\*1881) 407-.
- , pneumatic. *Rung*, (Capt.) G. Z. Instk. 6 (1886) 201-.
- for ships' screw propellers. *Campbell*, (Sir) A., & *Goolden*, W. T. L. Ps. S. P. 6 (1885) 147-; Ph. Mg. 18 (1884) 57-.

## 0160 Ships' Velocity

- indicator for ships' screw propellers. *Drouet, (le lt.) G. Rv. Mar. et Col.* 118 (1893) 458-.
- indicators. *Richard, G. Lum. Élect.* 15 (1885) 258-, 295-; 34 (1889) 101-.
- , new. *Richard, —. Cg. Int. Chron.* (1889) 205-.
- means of producing constant. *Webster, A. G. Am. J. Sc.* 3 (1897) 379-.
- periods. *Prytz, K. [1890] Kjøb. Dn. Vd. Selsk. Skr.* 7 (1890-94) 35-.
- spiral goniometry in relation to. *Barus, C. Am. J. Sc.* 48 (1894) 1-.
- stroboscopic measurements. *Ettingshausen, A. von. Carl Rpm.* 12 (1876) 1-.
- tachometer. *Donkin, B. Tilloch Ph. Mg.* 38 (1811) 42-.
- , *Thomas, A. As. Fr. C. R.* (1874) 154-.
- , *Sartiaux, E. Lum. Élect.* 13 (1884) 340-.
- , *Käs, A. Oestr. Z. Brgw.* 41 (1893) 471-.
- , differential. *Fuchs, K. Elekttech. Z.* 9 (1888) 300-.
- , electric, *Picou, R. V. Lum. Élect.* 29 (1888) 416-.
- , electrical hand. *Fessenden, R. A. Sc. Abs.* 3 (1900) 170-.
- , registering. *Anon. Elekttech. Z.* 7 (1886) 126-.
- testing and study. *Göpel, F. Z. Instk.* 16 (1896) 33-.
- and torsion, telephonic indicator. *Resio, C. C. R.* 94 (1882) 854-; *Lum. Élect.* 6 (\*1882) 399-.
- variations, in motors. *Léauté, H. Gén. Civ.* 12 (1887-88) 163.
- , —, *Bourcart, R. Mulhouse S. In. Bll.* 63 (1893) 418-.
- , small. *Anthony, W. A. Am. As. P.* (1886) 118-.
- Running, instrument recording velocity. *Marey, E. J. C. R.* 104 (1887) 1582-.

### SHIPS' VELOCITY.

- Hamill, H. Nicholson J.* 14 (1806) 343-.
- Mayette, J. Mâcon Ac. A.* 6 (1888) 341-.
- currents, etc., instrument for. *Napier, J. R. Glasg. Ph. S. P.* 3 (1848-53) 350-.
- indicator. *Russell, J. S. B. A. Rp.* (1842) (pt. 2) 109.
- instrument for. *Hopkinson, F. [1783-90] Am. Ph. S. T.* 2 (1786) 159-; 3 (1793) 239-.
- , *Cooke, J. Nicholson J.* 5 (1802) 48-, 265-.
- , *Burney, J. Nicholson J.* 24 (1809) 57-.
- , and governor of engines. *Lambinet, E. Rv. Mar. et Col.* 95 (1887) 177-.
- , by log-line. *Newman, J. QJ. Sc.* 2 (1817) 90-.
- instruments for. *Brit. Ass., Comm. B. A. Rp.* (1879) 210-.
- , *Gelcich, E. Z. Instk.* 4 (1884) 231-, 274-.

## Measurement of Acceleration 0160

- instruments for. Pressure-log experiments. *Froude, W. B. A. Rp.* (1874) 255-.
- log. *Gould, C. Gilbert A.* 8 (1801) 474-.
- , *Gelcich, E. Z. Instk.* 5 (1885) 394-.
- , *Baule, (le lt.) A. Rv. Mar. et Col.* 112 (1892) 374-; 120 (1894) 116-.
- , and anemometer and warning compass. *Fleuriais, G. Rv. Mar. et Col.* 71 (1881) 433-.
- , correction of errors. *Keller, F. A. E. (vi Add.) A. Hydrog.* 14 (1858) 387-.
- , electric. *Fleuriais, G. Rv. Mar. et Col.* 100 (1889) 329-.
- , —, *Le Goarant de Tromelin, (le lt.) —. Rv. Mar. et Col.* 110 (1891) 302-.
- , —, automatic. *Ricart Giralt, J. [1893] Barcel. Ac. Bl.* 1 (1892-1900) 122-.
- , —, on principle of Robinson cup anemometer. *Fleuriais, G. Rv. Mar. et Col.* 63 (1879) 465-; *C. R.* 96 (1883) 1633-.
- , —, —, —, —, —, *Le Goarant de Tromelin, G. C. R.* 96 (1883) 1441-.
- , hydrostatic. *Berthon, E. L. R. S. P.* 5 (1850) 919.
- logs, pressure-. *Napier, J. R. [1872] Glasg. Ph. S. P.* 8 (1873) 146-.
- and velocity of wind. *Pâris, (le lt.) A. Rv. Mar. et Col.* 87 (1885) 5-; 88 (1886) 78-.

- Steam-engine, piston, instrument for. *Tregaskis, R. Cornwall Pol. S. T.* (1842) 118-.
- Trains. *Fèvre, —. Par. A. Pon. Chauss.* 12 (1836) 345-.
- , *Haedenkamp, H. Grunert Arch.* 6 (1845) 172-.
- , *Steiner, F. Rv. Sc.-Ind.* 16 (1884) 320-.
- , *Hasler, G. Bern Mt.* (1889) vi-.
- , registering apparatus. *Desdouts, —. A. Pon. Chauss.* (1900) (*Trim.* 2) 168-.
- , —, electric. *Waldorp, H. Lum. Élect.* 8 (\*1883) 84-.
- , —, —, *Frishen, C. Elekttech. Z.* 7 (1886) 159-.
- , tachometer for. *Deneil, —. A. Mines* 2 (1852) 217-.
- Tuning-forks, tests of variation by. *Göpel, F. [1900] Sc. Abs.* 4 (1901) 318-.

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- Acceleration, geometrical treatment. *Dobbs, W. J. Mth. Gz.* 1 (1900) 201-.
- , and pressure meter. *Hrabowski, K. A. Ps. C.* 56 (1895) 768-.
- Atwood's machine. *Praag, L. S. van. Leijd. A. Ac.* (1817-18) 24 pp.
- , and apparatus for pendulum experiments. *Fischer, E. G. Gilbert A.* 14 (1803) 1-.
- , application. *Pfaundler, —. Innsb. Nt. Md. B.* 14 (1884) xxiii.
- , and clock, a new. *Baker, W. C. Ps. Rv.* 11 (1900) 105-.
- , determination of friction resistances in. *Bender, C. A. Ps. C.* 149 (1873) 122-.
- , elasticity of cord in. *Bouniakowsky, V. [1831] St Pét. Ac. Sc. Mm.* 2 (1833) 179-.



## Measurement of Force 0170

- Falling bodies, Traversi's theories. *Marini, A. P.* Brescia Cm. (1816-17) 95-.
- —, velocity, use of weighing-machine in determining. *Schönemann, T.* Berl. Mb. (1857) 159-.
- Gravity machine with one loose and two fixed pulleys. *Kosch, F.* Arch. Mth. Ps. 17 (1900) 113-.

*E., J. P.* Franklin I. J. 4 (1829) 212-.

Chronographs and apparatus for determining laws of motion. *Didion, I.* Fr. Cg. Se. (1837) 549-.

Energy of bodies moving with different velocities. *Treadwell, D.* Bost. Mm. Am. Ac. 8 (1863) 362-.

—, measure of work in theory of. *Moon, R.* Ph. Mg. 47 (1874) 291-.

Kinetscope, use in mechanics of slow motions. *Stichter, C. S.* Science 11 (1900) 535-.

Solids, motion. *Delanges, P.* Verona S. It. Mm. 3 (1786) 1-.

Watt's indicator, mathematical theory. *Le-cornu, L.* C. R. 118 (1894) 1034-.

*Ewart, P.* [1808] *Manch. Ph. S. Mm.* 2 (1813) 105-  
(*Ewart*). *Hodgkinson, E.* [1844] *Manch. Ph. S. Mm.* 7 (1846) 137-.  
*Coste, —.* *Les Mondes* 22 (1870) 379-.  
*Breton, P.* *Les Mondes* 22 (1870) 615-.  
*Moore, R.* *V. Nost. Eng. Mg.* 16 (1877) 335-.  
Absolute units of force. *Johnson, W. W.* *N. Y. Mth. S. Bl.* 3 (1894) 197-.  
Attractive and repulsive forces. *Zöllner, F.* *Leip. B.* 21 (1869) 281-.  
Barometric vacuum, suggested use as spring of constant strength (Cagniard de Latour). *Caligny, A. de.* *C. R.* 59 (1864) 1103-; 62 (1866) 800-.  
Bi- and tri-filar balances for absolute measurement. *Jahmann, G.* *Wien Ak. Sb.* 97 (1889) (*Ab. 2a*) 64-.  
Cotton-spinner, dynamic work. *Meuzy, A.* *A. Mines* 14 (1848) 139-.  
Dynamograph, Dudley's, uses. *Dudley, P. H.* [1879] *Wash. Ph. S. Bl.* 3 (1880) 29-.

*Regnier, E.* Par. Éc. Pol. J. cah. 5 (1798)  
160-; Par. Bll. S. Encour. 16 (1817) 133-.

*Gordon, L.* Glasg. Ph. S. P. 1 (1841-44)  
41-.

*Schinz, E.* Dingler 110 (1848) 242-.



# 0170 *Dynamometers* Measurement of Force *Dynamometers* 0170

- Richard, G.* Lum. Élect. 6 (\*1882) 559-; 7 (\*1882) 18-, 29-, 78-, 100-, 174-; 8 (\*1883) 297-; 16 (1885) 366-; 27 (1888) 551-; 32 (1889) 260-; 41 (1891) 209-.
- Kapp, G.* Elect. 12 (1884) 13-, 33-, 79-, 103-, 151-, 224-, 345-, 538-; 13 (1884) 8-, 79-, 201-.
- Jamieson, & others.* Elect. 12 (1884) 139-, et seq.
- Bourcart, R.* Mulhouse S. In. Bll. 61 (1891) 282-.
- combined absorption and transmission. *Flather, J. J.* Am. As. P. (1898) 244-.
- and comparison of ships in matter of resistance. *Ledieu, A.* C. R. 100 (1885) 837-.
- — — — — (Ledieu). *Taurines, A.* C. R. 102 (1886) 1057-.
- — — — — (Taurines). *Ledieu, A.* C. R. 102 (1886) 1091-.
- coupling. *Perry, J., & Ayrton, W. E.* B. A. Rp. (1881) 553.
- Desdouts's. Dubost, F.* Lum. Elect. 12 (1884) 131-.
- direct reading, *Trouvé. Trouvé, G.* C. R. 110 (1890) 1326-.
- — — — — *Anon.* Rv. Sc.-Ind. 23 (1891) 34-.
- for effort of traction or force of animate motors. *Morin, A.* Par. Bll. S. Encour. 36 (1837) 161-.
- — — — — or work developed by animate or inanimate motors. *Morin, A.* Fr. Cg. Sc. (1837) 583-.
- electric recording. *Resio, C.* C. R. 96 (1883) 1361-; Lum. Elect. 9 (\*1883) 81-.
- and ergometers. *Richelmy, P.* Tor. At. Ac. Sc. 5 (1869-70) 17-.
- Fischinger's. Buschkiel, C.* Elekttech. Z. 8 (1887) 386-.
- friction-. *Barrois, T.* Lille Mm. S. (1827-28) 114-.
- *Thomson, J.* (vi Adds.) B. A. Rp. (1855) (pt. 2) 209-.
- *Mayer, J. R. von.* D. Nf. Tbl. (\*1869) 63-.
- *Guigon, —.* [1882] I. Égypt. Bll. 3 (\*1883) 14-.
- *Menges, C. L. R. E.* 's Gravenh. I. Ing. Ts. (1886-87) (Verg.) 81-.
- *Beaumont, W. W.* I. CE. P. 95 (1889) 1-.
- *Rigaut, A.* Lum. Élect. 36 (1890) 610-.
- *Goss, W. F. M.* Elect. Rv. 37 (1895) 98-, 125-, 158-.
- and belt. *Froude, W.* (vi Adds.) ME. I. P. (1858) 92-.
- direct reading. *Jimels, C.* Gén. Civ. 17 (1890) 375-.
- Prony's (for revolving shaft). *Prony, R. de.* A. C. 19 (1821) 165-.
- — — — — *Saint-Léger, — de.* A. Mines 12 (1837) 67-.
- — — — — (Saint-Léger). *Poncelet, J. V.* C. R. 4 (1837) 678-.
- — — — — *Poncelet, J. V.* C. R. 4 (1837) 885-.
- — — — — *Passot, —.* Fr. Cg. Sc. 8 (1840) 31-.
- — — — — *Morris, E.* Franklin I. J. 5 (1843) 225-.
- — — — — *Pigeon, G.* Lyon Ac. Sc. Mm. 2 (1847) 507-.
- friction, Prony's. *Grandvoinet, J.* A. Gén. Civ. 2 (1863) 170-.
- — — — — *Tresca, H.* C. R. 58 (1864) 273-.
- — — — — *Kretz, —.* C. R. 58 (1864) 459-; Par. Ec. Norm. A. 2 (1873) 55-.
- — — — — arranged for evaluation of torque. *Hillairet, —.* C. R. 109 (1889) 798-.
- — — — — modifications. *Garnier, F.* A. Mines 12 (1837) 247-.
- — — — — reversed. *Wellner, G.* Dingler 223 (1877) 130-.
- — — — — and Welter's combined. *Hachette, J. N. P.* J. Gén. Civ. 11 (1846) 153-.
- — — — — *Raffard. Soubeyran, A.* [1885] Gén. Civ. 8 (1885-86) 68-.
- — — — — *Ventre, —.* [1886] I. Égypt. Bll. 7 (1887) 50-.
- — — — — run by circulation of water. *Ricco, A.* (xn) Rv. Sc.-Ind. 12 (1880) 443-.
- — — — — self-regulating. *Carpentier, J.* C. R. 89 (1879) 950-.
- — — — — for small motors. *Maréchal, C.* Éclair. Élect. 11 (1897) 210-.
- — — — — *Thiabaud. Bernardi, E.* Ven. I. At. (1884-85) 1355-.
- improved. *Tatham, W. P.* Franklin I. J. 82 (1881) 321-; 84 (1882) 401-.
- integrating. *Richard, G.* Lum. Elect. 16 (1885) 366-.
- — — — — *Raffard, —.* Par. S. Ps. Sé. (1887) 178-.
- — — — — of Meeze and Vernon-Boys. *Richard, G.* Lum. Élect. 14 (1884) 11-.
- at International Exhibition. *Guerout, A.* Lum. Élect. 4 (\*1881) 290-, 307-, 341-, 356-, 373-.
- Morin's. Trépied, C.* Lum. Élect. 1 (\*1879) 85-.
- new. *Cagniard-Latour, C.* C. R. 4 (1837) 899-.
- — — — — *Froude, W.* Bath S. J. 5 (1857) 216-.
- — — — — *Richard, G.* Lum. Elect. 8 (\*1883) 297-.
- Newcastle. *Amos, C. E.* Ag. S. J. 1 (1865) 204-.
- optical. *Latchinoff, M.* Lum. Elect. 3 (\*1881) 447-.
- Poncelet's, profile of springs. *Léauté, H.* Liouv. J. Mth. 9 (1883) 245-.
- for power of screws of ships. *Froude, W. I.* ME. P. (1877) 237-.
- rotation, Frémont. *Desquiens, F.* Gén. Civ. 21 (1892) 260-.
- — — — — *Richard. Gouilly, A.* Gén. Civ. 20 (1891-92) 395-.
- at Royal Technological Institute, Stockholm. *Nystrom, J. W.* Franklin I. J. 49 (1865) 392-.
- Ruggles's. Eliot, C. W.* [1866] Am. Ac. P. 7 (1868) 65-.
- for small motors. *Hoskin, J.* Franklin I. J. 131 (1891) 489-.
- — — — — steam engines (Macnaught). *Combes, C.* A. Mines 16 (1839) 519-.
- suitable for physiological inquiries. *Henry, C.* C. R. 121 (1895) 716-.
- Tatham. Tatham, W. P.* Franklin I. J. 120 (1885) 449-; 122 (1886) 377-.
- transmission. *Ayrton, W. E., & Perry, J.* Lum. Élect. 3 (\*1881) 405-.

- transmission. *Curie, P.* C. R. 103 (1886) 45-.
- , *Guigon, E.* [1888] I. Egypt. Bll. 9 (1889) 174-.
- , (*Guigon*). *Ventre, —.* [1888] I. Egypt. Bll. 9 (1889) 185-.
- , *Robinson, S. W.* Elect. Rv. 38 (1896) 625-, 656-.
- , autographic. *Kent, W.* [1879] Am. I. Mn. E. T. 8 (\*1880) 177-.
- , with direct reading and photographic record. *Mascart, —.* C. R. 110 (1890) 605-.
- , electric. *Kuz'minskij, P. D.* Rs. Ps.-C. S. J. 28 (Ps.) (1896) 226-.
- , new. *Deprez, M.* Lum. Elect. 13 (1884) 481-.
- , —, *Meylan, E.* Lum. Elect. 27 (1888) 424-.
- , —, *Dalby, W. E.* I. CE. P. 132 (1898) 47-.
- , permanent. *Smith, C. A.* [1884] Am. S. CE. T. 15 (1886) 357-.
- for use with driving-bands. *Hefner-Altenack, F. von.* (xii) Elekttech. Z. 2 (1881) 229-.
- with vernier. *Kleritj, L.* Berg-Hm. Ztg. 29 (1870) 3-, 16-.
- 
- Dynamometric experiments (*Ransonnet's*). *Keraudren, —.* J. Méd. Chir. Phm. 24 (1812) 41-.
- , *Dollfus, G.* (vii) Mon. Sc. 3 (1861) 29-.
- , methods on railways. *Desdouts, —.* A. Mines 8 (1885) 481-.
- , testing of agricultural implements. *Grandvoisinnet, J. A.* (xii) A. Agn. 2 (1876) 446-.
- Ergograph, new. *Binet, A., & Vashide, N.* C. R. 125 (1897) 1161-.
- Ergometers. *Hefner-Altenack, — von.* Elekttech. Z. 8 (1887) 514-; 9 (1888) 16.
- Explosive pressures, use of springs in measuring. *Vieille, P.* C. R. 115 (1892) 1268-.
- Explosives, force. *Vieille, P.* As. Fr. C. R. (1890) (Pt. 1) 53-.
- Gas-motors, atmospheric, power measurement. *Teichmann, K.* Dingler 220 (1876) 116-.
- Horse-power. *Gregory, O.* Nicholson J. 11 (1805) 145-.
- , *Aubuisson de Voisins, J. F. d'. A.* Mines 7 (1830) 145-.
- , —, *Reuleaux, F.* Civing. 3 (1857) 112-.
- , *Ouagliò, J.* Nöösterr. Gewerb. Vr. Vh. (1862) 161-.
- , experiments. *Minard, C. J.* Par. A. Pon. Chauss. 4 (1832) 125-.
- , measure of force by. *Hornblower, J. C.* Nicholson J. 11 (1805) 95-.
- , ratio of indicated to effective, Denny's M.M. trials. *Froude, W.* Nv. Archt. T. 17 (1876) 167-.
- Hydraulic brakes for guns, indicator-curve. *Vallier, —.* C. R. 129 (1899) 705-.
- Integrator, mechanical, for work done by a force. *Fuchs, K.* Mth. Termt. Éts. 13 (1895) 239-; Mth. Nt. B. Ung. 13 (1897) 144-.
- Locomotives, compound, tractive force. *Mellin, C. J.* Am. Eng. & Railroad J. 74 (1900) 152, 204.
- , tractive force. *Cole, F. J.* Am. Eng. & Railroad J. 74 (1900) 307-.
- Machines, power. *Marchal, O.* A. Gén. Civ. 5 (1866) 544-.
- , —, *Jacquemier, R.* Rv. Mar. et Col. 81 (1884) 535-.
- , with revolving shafts, tangential force. *Hachette, J. N. P.* J. Mines 31 (1812) 213-.
- Mechanic power. *Hornblower, J. C.* Nicholson J. 11 (1805) 264-.
- , —, (*Hornblower*). *Gregory, O.* Nicholson J. 12 (1805) 7-.
- , —, *Blake, E. W.* Silliman J. 30 (1836) 359-.
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- , —, to record 2 components. *Landi, U.* *Rv. Sc.* [Ind.] 30 (1898) 92-.
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- — —, — Port Bowen (73° N, 90° W). *Foster, H.* Phil. Trans. (1826) (pt. rv.) 1-.
- — —, New South Wales (Sir T. Brisbane's). *Kater, H.* Phil. Trans. (1823) 308-.
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## 0420 Abstract kinematics, including composition of motions and of displacements, relative motions, moving axes; theory of screws.

(See also 1620; Mathematics 8420.)

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- , —, and trajectories of 2 points, theorem. *Devulf, É.* [1882] *N. A. Mth.* 2 (1883) 297-.
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- , to find fixed curve giving a certain curve. *Phillips, É. Par. Ec. Norm. A.* 2 (1873) 353-.
- , motion of body about fixed point given by. *Padelletti, D. Nap. Rd.* 25 (1886) 242-.
- , theory. *Orlov, T. N. Rs. S. Nt. Mm. (Mth.)* 5 (1884) 159-; *Fschr. Mth.* (1884) 764.
- Rule for escaping weir in swimming. *Morley, F. Nt.* 35 (1887) 345.
- Sliding of surfaces, theorems. *Picard, É. N. A. Mth.* 14 (1895) 177-.
- Symbolical variability; representation by function  $p_i = x_i + \epsilon y_i + \epsilon^2 z_i$ . *Formenti, C. Mil. I. Lomb. Rd.* 16 (1883) 393-, 487-.
- Theta functions expressing direction-cosines of 2 orthogonal systems of coordinates, application. *Kötter, F. Berl. Ak. Sb.* (1895) 807-.
- Trajectories with acceleration in fixed direction. *Résal, H. A. C. R.* 90 (1880) 769-.
- , envelopes of, in plane rigid systems, curvature. *Mueller, R. Z. Mth. Ps.* 36 (1891) 257-.
- , evolutes of, in plane rigid systems, curvature. *Mueller, R. Z. Mth. Ps.* 36 (1891) 193-.
- in plane similarly variable systems, curvature. *Mueller, R. Z. Mth. Ps.* 36 (1891) 129-.
- of points of invariable system, curvature. *Bellavitis, G. Ven. At.* (1858-59) 991-.
- — — in moving solid. *Tannery, J. Par. Ec. Norm. A.* 3 (1886) 43-.
- — — — —, curvature. *Schönflies, A. Liège S. Sc. Mm.* 11 (1885) No. 6, 9 pp., No. 9, 15 pp.
- reducible to roulettes of developables. *Cesáro, E. N. A. Mth.* 3 (1884) 434-.
- Trigonometry of rectangular skew hexagon. *Burnside, W. Mess. Mth.* 28 (1899) 92-.
- , spherical, kinematic corollaries from formulae. *Warren, (Rev.) J. W. QJ. Mth.* 20 (1885) 170-.
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- , — — —, questions on. *Somov, P. Fschr. Mth.* (1889) 857-.
- and forces, analogy between. *Novarese, E. Tor. Ac. Sc. At.* 21 (1885) 900-.
- , instantaneous changes in system of material points. *Phillips, É. Liouv. J. Mth.* 14 (1849) 300-.



- Velocities, total, and radial component, relation between curvatures of graphs for. *Breglia, E. G.* Mt. 30 (1892) 344-.
- of any order of plane similarly variable system. *Mehmke, R.* Civing. 29 (1883) 487-.
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- Velocity and acceleration planes, application of graphic kinematics. *Mohr, —.* Civing. 33 (1887) 631-.
- Walking and grazing of quadrupeds. *Walton, W.* QJ. Mth. 5 (1862) 377-.
- Wickerwork, jointed, systems, and their degrees of internal freedom. *Larmor, J.* Camb. Ph. S. P. 5 (1886) 161-.

## THEORY OF SCREWS.

(See also 1240.)

- Lehmus, —.* Crelle J. 4 (1829) 202-.
- (1st memoir.) *Ball, R. S.* [1871] Ir. Ac. T. 25 (1872) 157-.
- (2nd memoir. Application to dynamics of rigid body.) *Ball, R. S.* [1873] (ix) Phil. Trans. 164 (1874) 15-.
- (3rd memoir. Screw coordinates, and application to dynamics of rigid body.) *Ball, R. S.* [1874] Ir. Ac. T. 25 (1875) 295-.
- (4th memoir. Extension to dynamics of any material system.) *Ball, R. S.* [1881] Ir. Ac. T. 28 (1880-86) 99-.
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- (8th memoir. Plane geometry illustrating motion with 3 degrees of freedom.) *Ball, (Sir) R. S.* [1888] Ir. Ac. T. 29 (1887-92) 247-.
- (9th memoir. Permanent screws.) *Ball, (Sir) R. S.* [1890] Ir. Ac. T. 29 (1887-92) 613-.
- (10th memoir. Pitch invariants and chiasitic homography.) *Ball, (Sir) R. S.* [1894] Ir. Ac. T. 30 (1892-96) 559-.
- (11th memoir. Impulsive and instantaneous screws.) *Ball, (Sir) R. S.* [1896] Ir. Ac. T. 31 (1896-1901) 99-.
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- (— — —, amendment.) *Ball, (Sir) R. S.* [1898] Ir. Ac. P. 4 (1896-98) 667-.
- Application of mathematics. *Briggs, Robt.* Am. Ph. S. P. 9 (1862-63) 278-.
- Applications. *Zančevskij, I.* N. Rs. S. Nt. Mm. (Mth.) 9 (1889) 1-, 1-; Fsch. Mth. (1889) 930.
- Bivectors and theory of screws. *Kotel'nikov, A.* Kazan Un. Mm. (1895) (Pt. 9), (Pt. 11) 79-; (1896) (Pt. 1) 139-, (Pt. 2) 111-; Fsch. Mth. (1895) 804-.
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- Complexes of axes of screws. *Emilio, R. d'.* Ven. I. At. (1884-85) 1135-.
- Contributions to theory. *Ball, R. S.* B. A. Rp. 43 (1873) (Sect.) 27-; R. S. P. 21 (1873) 385-; Mth. A. 9 (1876) 541-; Ir. Ac. P. 3 (1883) 661-.
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- Displacements of rigid body subject to 4 conditions, plane representation. *Mannheim, A.* C. R. 100 (1885) 268-.
- Distribution in space of dyads of each pair of forces to which a given system is equivalent. *Budde, E.* Berl. Ps. Gs. Vh. (1888) 77-.
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- of rigid body under forces constant in magnitude and direction. *Segre, C.* Rm. S. It. Mm. 6 (1887) No. 3, 35 pp.
- — systems; axoid (screw complex) of freedom. *Padelletti, D.* Nap. Rd. 22 (1883) 13-.
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- screws, complexes. *Franke, J. N.* (xii) Krk. Ak. (Mt.-Prz.) Pam. 7 (1882) 177-.
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- Screw coordinates and kinetic energy. *Ball, (Sir) R. S.* Camb. Ph. S. P. 8 (1895) 240-.

- Screw motion. *Zamboni, G.* Ven. At. 2 (1843) 341-.
- , *Minich, S. R.* Ven. At. 3 (1844) 321-.
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- of rigid body. *Somoff, P.* Fsch. Mth. (1896) 579-.
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- , transformation into two of equal parameter. *Bolotov, E.* Kazan S. Ps.-Mth. Bll. 3 (1893) 97-.
- velocities of rigid body with different number of supporting surfaces. *Somoff, P.* Z. Mth. Ps. 42 (1897) 133-, 161-; 45 (1900) 245-; Fsch. Mth. (1897) 622-.
- Screws. *Lebon, E.* N. A. Mth. 3 (1884) 40-.
- , and centres, axes, etc. of homology of similar figures. *Minich, S. R.* Ven. I. At. 2 (1875-76) 237-.
- in elliptic space. *Buchheim, A.* L. Mth. S. P. 15 (\*1883-84) 83-; 16 (1884-85) 15-; 17 (1885-86) 240-; 18 (1886-87) 88-.
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- , *Morison, G. S.* Am. Eng. & Railroad J. 70 (1896) 341.
- , *Strong, G. S.* Am. Eng. & Railroad J. 70 (1896) 341-.
- , *Henderson, G. R.* Am. Eng. & Railroad J. 71 (1897) 306-, 342.
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- in motion, conditions of stability. *Le Châtelier, —.* C. R. 28 (1849) 151-.
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- , —, *Cole, F. J.* Am. Eng. & Railroad J. 68 (1894) 198-, 251-.
- , etc. on springs, oscillatory movements. *Desmousseaux de Givré, F. X. É.* Par. Ing. Civ. Mm. (1878) 389-, 406-.
- , stability. *Résal, H.* A. Mines 3 (1853) 411-.
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- and vibration of vessels. *Yarrow, A. F.* Railroad & Eng. J. 66 (1892) 365-.
- , vibrations, prevention. *Schubert, H.* [1898] Hamb. Mth. Gs. Mt. 3 (1900) 354-.
- Rotating bodies, balancing. *Jansen, W. Z.* Instk. 13 (1893) 229-.
- Steam engines. *Schlick, O.* Nv. Archt. T. 42 (1900) 135-.
- , high-speed. *Rigg, A.* Eng. S. T. (1891) 23-.
- Ventilating machines, equilibrium. *Godeaux, A.* Rv. Un. Mines 42 (1898) 347-.

## 0430 Kinematics of machinery.

(See also 1640, 2040, 3200-3290, Physics 2490.)

- (Reuleaux.) *Iigin, V.* N. Rs. S. Nt. Mm. (Mth.) 1 (\*1878).
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- (Hochmann.) *Somov, P. O.* Rs. Ps.-C. S. J. 22 (Ps.) (1890) 285-; J. de Ps. 10 (1891) 594.
- (Somov.) *Hochmann, C.* Rs. Ps.-C. S. J. 24 (Ps.) (1892) 145-.
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- Applied kinematics, problems. *Marcus, H.* Civing. 30 (1884) 23-.

### BALANCING OF MACHINERY.

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- Automatic balance of reciprocating mechanism. *Beaumont, W. W.* B. A. Rp. (1893) 665-.
- Balance-weight, cylindrical segment, formula for size. *Napier, J. R.* Glasg. T. I. Eng. 8 (1865) 66-.
- Inertia in machines of periodically uniform motion. *Sinigaglia, F.* Cuyper Rv. Un. 14 (1883) 20-.
- of moving parts in engines, calculation. *Jacobus, D. S.* Am. As. P. (1887) 166-.

- Ball bearings. *Barr, M.* Elect. Rv. 43 (1898) 769-.
- , distancing of balls for. *Babbitt, A. B.* Dingler 305 (1897) 158.
- , theoretical study. *Bourlet, C.* Gén. Civ. 33 (1898) 139-, 153-.
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- Beam for working pumps etc. *Anon.* (vi 604) Gleanings Sc. 1 (1829) 56-.
- Bearings and their supports. *Armengaud, C.* Civing. 3 (1857) 185-, 246-.
- Brake of Hughes apparatus. *Dissimoz, E. J.* Tél. 16 (1892) 133-.
- , hydraulic. *Cavallero, A.* Tor. Ac. Sc. At. 10 (1875) 577-.
- Brakes, action. *Seguela, —.* A. Mines 2 (1882) 361-.
- , hydraulic. *Laurent, P.* Rv. Artl. 23 (1883) 207-.
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- , —, — (Stauss system). *Demeure, A.* Rv. Un. Mines 21 (1887) 448-.
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- , safety-. *Mohr, C. F.* Bonn SB. Niedr. Gs. (1870) 61-.
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- , —, —, *Hauer, J. (Ritter) von.* Wien Berg-Hm. Jb. 32 (1884) 235-.
- Cam, form of. *Campbell, J. R.* [1875] L. Mth. S. P. 7 (1876) 236-.
- , gear. *Chelius, P.* Civing. 6 (1860) 266-.
- Cams, contact. *Ball, R. S.* [1871] Ir. Ac. P. 1 (1873-74) 243-.
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- , of hammers, shape. *Thiré, A.* A. Mines 11 (1887) 225-.
- , pile drivers, shape. *Thiré, A.* A. Mines 9 (1886) 282-.
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- , improvement. *Ximenes, L.* Verona Mm. S. It. 1 (1782) 613-.
- Carding of fibres, principles. *Imbs, J. A.* Cons. Arts et Mét. 3 (1891) 239-.
- Centrifugal action in practical work. *Laidlaw, J.* Glasg. I. Eng. T. 34 (1891) 149-.
- , apparatus. *Kayser, W.* Halle Z. Nw. 12 (1858) 47-.
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- , cream separator. *Fleischmann, W.* Lndw. V.-St. 26 (1881) 167-.
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- , fan-wheel. *Martin, L.* Wien Sb. 54 (1866) (Ab. 2) 412-.
- , force, effects on axes of rotation. *Rankine, W. J. M.* Les Mondes 20 (1869) 132-.
- , —, gain of power by. *Bakewell, T. W.* Franklin I. J. 22 (1851) 333-.
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- , —, theory. *Matthey, C. A.* Glasg. I. Eng. T. 42 (1899) 232-.
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- Crane. *Gent, T. J.* Mines 13 (1802-3) 454-.
- , account of; and method of working chain in machinery so as to exceed ropes in flexibility and strength. *Gilpin, G.* Nicholson J. 15 (1806) 126-.
- , with movable carriage. *Bacmeister, H.* Franklin I. J. 19 (1850) 344-.
- , new. *Dehargne, —.* Par. Bil. S. Encour. 47 (1848) 53-, 239-.
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- , —, conditions of equilibrium. *Cousin, L.* (xii) Brux. S. Sc. A. 5 (1881) (Pt. 2) 77-.
- Cranes with direct traction. *Chrétien, J.* Par. Ing. Civ. Mm. (1875) 372-.
- , modifications. *Lametz, —.* Metz Ac. Mm. 76 (1896) 247-.

#### CRANKS, CONNECTING RODS AND CROSSHEADS.

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- , —, bearings, friction at, effect on forces transmitted. *Webb, J. B., & Jacobus, D. S.* A. Mth. 4 (1888) 169-.
- , —, dead points. *Girault, C.* A. Gén. Civ. 3 (1864) 665-.
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- , —, influence of obliquity on motion of steam engine. *Guzzi, P.* Il Polit. 20 (1872) 44-.
- , —, in motion, closed curves generated by points of, practical rules for substitution for given arc. *Leauté, H.* C. R. 96 (1883) 1356-, 1649-.
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- , —, inertia, graphical treatment. *McGregor, J. G.* [1892] N. Scotia I. Sc. P. & T. 8 (1895) 193-.
- , —, —, mathematical theory. *Mohr, —.* Civing. 41 (1895) 591-.
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- Crankaction. [Papers of Russell and Neukrantz.] *E., W. von.* (vi *Adds.*) Dingler 78 (1840) 4-.
- , elliptic wheels for lessening irregularity. *Crelle, A. L.* Crelle J. 1 (1826) 375-.
- , Woolf's method of equalizing. *Jones, T.* Nicholson J. 7 (1804) 133-.
- and connecting rod, mathematical theory. *Vaes, F. J.* 's Gravenh. I. Ing. Ts. (1890-91) (Vh.) 63-; (1891-92) (Vh.) 52-; Delft Éc. Pol. A. 8 (1897) 115-.
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- machinery, dynamics. *Lorenz, H. Z.* Mth. Ps. 44 (1899) 1-, 65-, 177-; 45 (1900) 57-, 177-.
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- , —, applications. *Rittershaus, T.* Civing. 24 (1878) 171-.
- , —, construction of acceleration in. *Rittershaus, T.* Civing. 25 (1879) 461-.
- , —, removal of irregularity. *Prehn, —.* Crelle J. 40 (1850) 205-.
- , —, position, corresponding to given position of piston in steam-engine. *Léauté, H.* C. R. 104 (1887) 410-.
- , —, problem to determine. *Quinby, A. B.* Silliman J. 11 (1826) 338-.
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- , 2 theorems on a class. *Thue, A.* Christiania F. (1888) No. 9, 15 pp.
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- Ferrel*, W. *Gould As. J.* 5 (1858) 97-; 113-.
- (Poireault's law.) *Babinet*, J. C. R. 49 (1859) 769-.
- Ferrel*, W. *Camb. (M.) Mth. M.* 1 (1859) 140-; 210-; 300-; 366-; 397-; 2 (1860) 89-; 339-; 374-.
- Price*, B. *B. A. Rp.* (1861) (pt. 2) 6-.
- Felgel*, R. (vi *Adds.*) *Wien Jbr. Ober-Realsch. Inn. Stadt* 5 (1863) 17-.
- Matthiessen*, L. *Z. Mth. Ps.* 10 (1865) 402-.
- Buff*, H. A. C. *Phm.* 4 (*Suppl. Bd.*) (1865-66) 207-.
- Page*, C. E. *N. A. Mth.* 6 (1867) 97-; 387-; 481-; 7 (1868) 337-.
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- Birkenmajer*, L. (xn) *Kosmos (Lw.)* 8 (1883) 62-.

- Hendricks*, J. E. *Des Moines Anal.* 10 (1883) 145-; *Science* 2 (\*1883) 135-; 3 (1884) 275-; *V. Nost. Eng. Mg.* 30 (1884) 47-.
- Roth*, F. *Exner Rpm.* 21 (1885) 506-; 774.
- Ferron*, E. *Lux. I. Pb.* 20 (1886) 109-.
- Lindelöf*, L. *Helsingf. Acta* 16 (1888) 369-.
- Andrade*, J. *Rv. Sc.* 4 (1895) 680-.
- Rudzki*, M. P. *Wiad. Mt.* 4 (1900) 240-.
- Body moving at right angles to meridian. *Babinet*, J. C. R. 49 (1859) 686-.
- Clock working by Earth's motion, hypothetical. *Böhner*, —. *Sch. Nf. Gs. Vh.* (1886-87) 47.
- Component, horizontal, of Earth's rotation, apparatus to show. *Andrade*, J. C. R. 121 (1895) 511-.
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- S.*, W. *Camb. and Dubl. Mth. J.* 3 (1848) 206-.
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- Brun, F. de.* Stockh. Öfv. (1893) 455-; Fsch. Mth. (1893-94) 1431-.

- Appelroth, G. G.* Mosc. S. Sc. Bil. 91 (No. 1) (1894) 1-; Mosc. Un. Mm. (*Ps.-Mth.*) 11 (1894) xi + 112 pp.
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- Liouville, R.* C. R. 120 (1895) 903-.
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- Levi-Civita, T.* Rm. R. Ac. Linc. Rd. 5 (1896) (*Sem.* 2) 3-, 122-.
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- , 1839. *Bruyn, A. W. de, & Sesseler, —.* Tindal Vh. Zeewezen 2 (1841) 428-.
- , 1844. *Evain, (Baron) —.* Brux. A. Tr. Pbl. 5 (1847) 327-.
- , 1856. *Borries, — von.* Brux. A. Tr. Pbl. 15 (1856-57) 427-.
- Cartridge cap (obturateur inflammateur). *Cosson, E.* C. R. 84 (1877) 1481-; 85 (1877) 383.
- Cartridges with compressed air. *Fournier, A.* [1890] Charente-Inf. S. Sc. A. 27 (1891) 16-.
- Centrifugal projectile. *Steinheil, C. A. von.* Wien SB. 1 (1848) 315.
- Chapel's shot. *Žukovskij, N. E.* [1889] Mosc. S. Sc. Bil. 65 (No. 1) (1890) 55-; Fschr. Ps. (1890) (Ab. 1) 387-.
- Compensating powder. *Totten, (Lt.) C. A. L.* Franklin I. J. 74 (1877) 54-, 89-.

## DEVIATION.

- Magnus, G.* Berl. Ab. (1852) (Ps.) 1-.
- Page, C. E.* Rv. Artl. 2 (1873) 103-.
- Cranz, C.* [1897] Würtb. Jh. 54 (1898) lxxv-.
- causes, and counteraction by rifling. *Longridge, J. A.* (vi Add.) CE. I. P. 19 (1859-60) 322-.
- constant. *Cranz, C.* D. Mth. Vr. Jbr. 6 (1899) (Heft 1) 110-.

- due to Earth's rotation. *Dalton, J. H. C.* [1886] Un. Serv. I. J. 30 (1886-87) 789-.
- — — want of symmetry of projectile, effect of rotation in correcting. *Brooks, C. H.* (vi Add.) CE. I. P. 19 (1859-60) 335-.
- of elongated projectiles. *Barnard, J. G.* Silliman J. 29 (1860) 190-.
- — — fired from rifled guns. *Owen, C. H.* Woolw. P. 4 (1865) 180-.
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- — —. *Flammarion, C.* Cosmos 4 (1866) 481-.
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- — —. *Thiesen, M. F.* (xii) Berl. Ps. Gs. Vh. 1 (1882) 64-.
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- — —. *Stone, O.* Am. J. Mth. 2 (1879) 211-.
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- wind problem. *Ruckman, (Lt.) J. W.* Sch. Mines Q. N. Y. 11 (1890) 306-; 12 (1891) 43-.
- Discoidal projectiles, property. *Chapel, (Capt.) —.* Rv. Artl. 20 (1882) 415-.
- Dispersion, natural, and law of errors. *Muyden, A. van.* [1875] Laus. S. Vd. Bll. 14 (1877) 1-.
- of shot, application of law of probabilities. *Féray, (capit.) —.* Rv. Artl. 20 (1882) 438-.
- shrapnel after explosion. *Résal, H. A.* Liouv. J. Mth. 1 (1875) 121-.
- Elevation of Dutch naval guns. *Gobius, G. F. G.* Swart Vh. (1854) (Afd. 2) 16-.
- Elongated projectiles. *Radau, R.* C. R. 66 (1868) 1032-.
- — —, determination of certain quantities. *Martin de Brettes, —.* C. R. 69 (1869) 1239-.
- — — fired from rifled guns, their peculiarity of attaining greater ranges in air than *in vacuo*. *D[arapskij], —.* Dingler 191 (1869) 202-.
- Experimental ballistics. *Le Boulengé, P.* [1867] Brux. Mm. Cour. 8vo, 20 (1868) 94 pp.
- — —. *Melsen, —.* Brux. Ac. Bll. 11 (1886) 149 (bis)-.
- — —, question in. *Duchène, A.* [1874] Rv. Artl. 5 (1875) 223-.
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- priming. *Chavannes, E.* Laus. Bll. S. Vd. 1 (1842-45) 26-.
- Explosives. *Banús y Comas, C.* Madrid Ac. Ci. Mm. 20 (1890-1901) 401 pp.

Explosives, high, new system of throwing. *Maxim, H.* [1897] Un. Serv. I. J. 42 (1898) 493-.

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— and their use in warfare. *Stuten, J. Z.* 's Gravenh. I. Ing. Ts. (1898-99) (*Verg.*) 174-.

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—, modern developments. *Sparre, (le comte) — de.* Lyon Ac. Mm. (Sc.) 31 (1892) 383-.

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—, comparative, for spherical shot. *Didion, I.* Par. Éc. Pol. J. 27<sup>e</sup> cah. (1839) 51-.

—, modes of determining. *Pole, W.* [1867] (xi) Un. Serv. I. J. 11 (1868) 1-.

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—, —, formula allowing for curvature of trajectory between covering mass and target. *Sparre, M. de.* Rv. Artl. 8 (1876) 122-.

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#### 2030 Applications of the first variation of integrals; the partial differential equations.

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- and equations of dynamics. *Shebuev, G. N.* [1881] (xii) Kazan S. Nt. (*Ps.-Mth.*) P. 1 (1883) [No. 4] 24-.
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- minimum of an integral. *Sabinine, G. A.* Mt. 14 (1886-87) 13-.
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- Mechanical problems, use of series given by Gauss in. *Lampe, E.* Berl. Ps. Gs. Vh. (1888) 47-.
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- Principle of last multiplier. *Jacobi, C. G. J.* G. Arcad. 99 (1844) 129-.
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- Trajectories, on given surface or in space, rendering minimum  $\int_0^s \phi(v) ds$ . *Roger, É.* C. R. 40 (1855) 1176-.
- , minimal,  $\delta \int_{s_1}^{s_2} \phi(v) ds = 0$ . *Schuringa, P.* [1872] Arch. Néerl. 8 (1873) 1-.

## 2040 Equivalence of dynamical problems, dynamical analogues, models. (See also 0430.)

- Analogies of second law of thermodynamics. Boltzmann, L. Crelle J. Mth. 100 (1887) 201-.
- , mechanical and electrical. Bedell, F., & Crehore, A. C. Elect. Rev. 32 (1893) 126-.
- Analogue, cyclic, of inductive action of circular currents. Hasenoechl, F. Wien Ak. Sb. 105 (1896) (Ab. 2a) 900-.
- Analogues, statical and kinematical. Everett, J. D. B. A. Rp. (1874) (Sect.) 11.
- Analogy between motion of rigid body about fixed point and equilibrium of elastic rod. Žukovskij, N. E. [1900] Rec. Mth. (Moscou) 21 (1901) 542-; Fsch. Mth. (1900) 703.
- Analytical equivalence of dynamical problems. Stäckel, —. Crelle J. Mth. 107 (1891) 319-.
- Berliner's molecularium. Anon. Tel. J. 22 (1888) 255-.
- Consonance, interference and absorption in sound and light, pendulum experiments. Isenkrahe, C. Carl Rpm. 16 (1880) 99-; 516-.
- Dynamical equations, transformation. Picciati, G. N. Cim. 33 (1893) 241-.
- equivalence of problems of stationary temperatures, torsion and flow in pipes. Boussinesq, J. Liouv. J. Mth. 6 (1880) 177-.
- Forces required to produce equal displacements, homologous systems. Siacci, F. Rm. R. Ac. Line. Rd. 5 (1889) (Sem. 1) 626-; 856-.
- Gyroscope and Hall's and Faraday's phenomena. Élie, B. J. de Ps. 1 (1882) 269-.
- Homography in mechanics. Appell, P. C. R. 108 (1889) 224-; Am. J. Mth. 12 (1890) 103-.
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- Nobili's rings by liquid currents. Decharme, C. C. R. 94 (1882) 722-; A. C. 28 (1883) 198-.
- Imperfect bicyclic system representing induction of 2 circuits. Garbasso, A. Tor. Ac. Se. At. 32 (1896) 746- or 1008-.
- Isogonal transformations in mechanics. Goursat, É. C. R. 108 (1889) 446-.
- — — Darboux, G. C. R. 108 (1889) 449-.
- Machines and models. Sang, E. Edinb. N. Ph. J. 14 (1833) 145-; 23 (1837) 262-; 28 (1838) 70-.
- — —, comparison. Chaubry, —. [1800] Le Mans Tr. S. (1820) 33-.
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- —, theory. *Rankine, W. J. M.* [1870] Phil. Trans. 161 (1871) 267-, 305-.
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- — — — — *Hagenbach-Schöff, E.* Arch. Sc. Ps. Nt. 56 (1876) 325-.
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- , and generation of vortices in fluids. *Noguès, A. F.* *Chili S. Sc. Act.* 3 (1893) 155-.
- , theory. *Bezold, W. von.* *Berl. Ak. Sb.* (1890) 1295-.
- , —, and hydrodynamics. *Švedov, T.* *Rs. Ps.-C. S. J.* 18 (*Ps.*) (1886) 279-; *A. Ps. C. (Beibl.)* 11 (1887) 306-.
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- — — water vapour. Parenty, H. A. C. 8 (1896) 5-; 12 (1897) 289-.
- permanent gases. Illeck, J. Civing. 23 (1877) 343-, 643-.
- — — (Illeck). Herrmann, E. Civing. 23 (1877) 571-.
- — —. Emden, R. A. Ps. C. 69 (1899) 264-, 426-.
- — — motion. Hugoniot, —. A. C. 9 (1886) 375-.
- under pressure. Schmidt, G. G. Gilbert A. 66 (1820) 39-.
- — —. Hood, C. (vi Adds.) CE. I. P. 1 (1840) 87-.
- — —. Froude, W. (vi Adds.) CE. I. P. 6 (1847) 356-.
- — — high pressures. Koch, F. K. L. Gött. Stud. Vr. 1 (1824) 1-.
- — — (Koch). Schmidt, G. G. Pogg. A. 2 (1824) 39-.
- — —. Weisbach, J. Civing. 12 (1866) 1-, 77-.
- — —. Zeuner, G. A. [1871] (xi) Civing. 20 (1874) 1-.
- — —. Salcher, P., & Whitehead, J. [1888-90] Wien Az. 25 (1889) 165-; Wien Ak. Sb. 98 (1890) (Ab. 2a) 267-.
- — —, in diverging streams. Hopkins, T. [1828] Manch. Ph. S. Mm. 5 (1831) 208-.
- — —, Koch's experiments. Buff, H. Pogg. A. 37 (1836) 277-.

under various pressures. [Barré de] *Saint-Venant*, —, & *Wantzel*, L. C. R. 8 (1839) 294-; *Par. Éc. Pol. J.* 27<sup>e</sup> cah. (1839) 85-; C. R. 17 (1843) 1140-.

reaction of jet. *Cotterill*, J. H. (vii) R. School Nv. Archt. An. No. 4 (1874) 105-.

resistance by sheet of liquid tangent to orifice. *Seguin*, J. M. (xii) *Isère S. Bil.* 1 (1869) 114-.

steam and superheated fluids. *Zeuner*, G. *Civing*. 10 (1864) 87-.

— — —, *Zeuner's formulæ*. *Dupré*, A. C. R. 59 (1864) 596-.

horizontal, of heavy incompressible homogeneous fluid. *Poisson*, S. D. *Par. Éc. Pol. Cor.* 1 (1804-08) 289-.

lateral, of heavy fluid. *Steen*, A. (xii) *Ts. Mth.* 2 (1872) 145-.

### Liquids.

*Eytelwein*, J. A. *Berl. Ab.* (1814-15) (*Mth.*) 137-; (vi *Adds.*) (1818-19) (*Mth.*) 9-.

*Potts*, C. *Franklin I. J.* 4 (1829) 280-.

*Donkin*, B. *CE. I. T.* 1 (1836) 215-.

*Gordon*, L. *Glasg. Ph. S. P.* 1 (1841-44) 258-.

*Leslie*, J. (vi *Adds.*) *CE. I. P.* 14 (1854-55) 273-; (iii) *Franklin I. J.* 29 (1855) 335-.

*Gauckler*, P. H. C. R. 64 (1867) 818-.

*Clerk*, H. B. A. *Rp.* (1869) (*Sect.*) 209.

*Parrochetti*, A. *Il Polit.* 18 (1870) 49-.

*Thomson*, (Prof.) *Jas.* B. A. *Rp.* (1876) 243-.

automatic sprinklers. *Woodbury*, C. J. H. *Am. As. P.* (1885) 159-.

cases, 2. *Meissel*, E. *Arch. Mth. Ps.* 55 (1873) 241-.

and contraction of jets. *Pacinotti*, L., & *Perrin*, G. (vi *Adds.*) *Il Cim.* 4 (1846) 3-.

experiments at Holyoke, U.S.A. *Ellis*, T. G. [1875] *Am. S. CE. T.* 5 (1876) 19-.

form and direction of jets. *Bidone*, G. [1829] *Tor. Mm. Ac.* 34 (1830) 229-.

— of jets. *Magnus*, G. *Berl. B.* (1855) 117-; *Pogg. A.* 95 (1855) 1-; 106 (1859) 1-.

— — —, *Buff*, H. *Pogg. A.* 100 (1857) 168-.

height of jet, in relation to head and diameter of orifice. *Razzaboni*, C. *Bologna Ac. Sc. Mm.* 3 (1892) 189-.

influence of temperature. *Baumgartner*, G. A. *Ps. C.* 153 (1874) 44-.

— — — (*Baumgartner*). *Meyer*, O. E. A. *Ps. C.* 153 (1874) 619-.

from nozzles. *Napier*, R. D. *V. Nost. Eng. Mg.* 15 (1876) 240-.

— — — with converging entrance and diverging outlet, at various velocities, frictional resistance. *Brownlee*, J. *Glasg. I. Eng. T.* 19 (1876) 81-.

orifices in bottom and sides of vessels. *Stratico*, S. *Mil. Mm. I. Lomb. Ven.* 2 (1814-15) 91-.

— — — of vessel. *Bonati*, T. *Verona Mm. S. It.* 5 (1790) 501-.

— near bottom of vessel, velocity assumed by various elements. *Flamant*, A., & *Saint-Venant*, B. de. C. R. 97 (1883) 1027-, 1105-.

— circular, form of jet. *Savart*, F. A. C. 53 (1833) 337-.

— — — —, *Plateau*, J. A. F. *Brux. Ac. Bil.* 23 (1856) 737-.

orifices expanded, attraction due to. *Ridout*, R. H. [1880] *L. Ps. S. P.* 4 (1881) 4-; *Ph. Mg.* 9 (1880) 435-.

— in hemispherical bottom of open topped cylindrical vessel, influence of temperature. *Isherwood*, B. F. *Franklin I. J.* 75 (1878) 339-.

— lateral. *Krebs*, G. *Carl Rpm.* 16 (1880) 131-.

— — —, pressure in and near orifice. *Napier*, R. D. *Glasg. I. Eng. T.* 22 (1879) 159-.

— neighbouring. *Aubuisson de Voisins*, J. F. d'. *Toul. Mm. Ac.* 6 (1843) 112-.

— open at top. *Lafont*, — de. *Par. A. Pon. Chauss.* 1 (1861) 225-.

— in pierced plate. *Briggs*, R. [1876-77] *Franklin I. J.* 73 (1877) 123-; 74 (1877) 347-.

— rectangular. *Aubuisson de Voisins*, J. F. d'. A. C. 44 (1830) 225-; *Franklin I. J.* 20 (1850) 1-, 73-; *Crelle J. Bauk.* 17 (1842) 289-.

— — —, with bilateral contraction. *Deschwenden*, J. W. von. *Zür. Mt.* 2 (1850-52) 483-; 3 (1853-55) 1-, 218-.

— — —, vertical. *Niemann*, —. *Z. Bauw.* 19 (1869) 395-.

— — —, experiments. *Poncelet*, —, & *Lesbros*, —. [1829] *Par. Mm. Sav. Étr.* 3 (1832) 242-.

— — —, —. *Lesbros*, —. *Par. Mm. Sav. Étr.* 13 (1852) 1-; C. R. 31 (1850) 86-.

— — —, open at top. *Eytelwein*, J. A. *Berl. Ab.* (1830) 129-.

— — —, in thin wall. *Minard*, C. J., & *Tourneux*, —. *Par. A. Pon. Chauss.* 3 (1832) 405-.

— small. *Avanzini*, G. *Mil. Mm. I. Lomb. Ven.* 3 (1816-17) 203-.

— — —. *Betti*, E. *Tortolini A.* 1 (1850) 425-.

— — —, at bottom of vessel. *Parrot*, G. F. *Pogg. A.* 65 (1845) 389-.

— — —, and laws of impact. *Shellbach*, C. H. *Crelle J.* 45 (1853) 268-.

— in thin wall. *Boussinesq*, J. C. R. 70 (1870) 33-, 177-, 1279-.

— — — —. *Phillips*, É. C. R. 75 (1872) 1733-.

— — — — and from ajutages. *Feilitzsch*, F. C. O. von. *Pogg. A.* 63 (1844) 1-, 173-, 216-.

under very high pressure. *Weisbach*, J. *Ing.* 1 (1848) 558-; *Civing*. 5 (1859) 83-; 9 (1863) 1-.

— constant pressure. *Weisbach*, J. *Civing*. 10 (1864) 1-.

— very low pressure. *Weisbach*, J. *Civing*. 10 (1864) 171-.

of pumps and cannon. *Barret*, —. *Rv. Mar. et Col.* 45 (1875) 634-.

at rate differing from that of constant influx. *Razzaboni*, C. [1859] (xi) *Mod. Ac. Sc. Mm.* 3 (1861) 101-.

sluices and similar orifices. *Bornemann*, K. R. *Civing*. 26 (1880) 297-.

at different temperatures. *Unwin*, W. C. [1878] *L. Ps. S. P.* 2 (1879) 325-; *Ph. Mg.* 6 (1878) 281-.

- at different temperatures, experiments. *Mair*, *J. G.* I. CE. P. 84 (1886) 424-.
- theory. *Lorgna*, *A. M.* Verona S. It. Mm. 4 (1788) 369-.
- Torricelli's theorem. *Hansen*, *J. C. A.* Ps. C. 133 (1868) 259-.
- (Hansen). *Szotczek*, *J. A.* Ps. C. 134 (1868) 476-.
- in vertical plane. *Meissel*, *E.* Pogg. A. 95 (1855) 276-.
- under water. *Fox*, *R. W.* R. I. J. 1 (1831) 368, 599-.
- non-circular. *Strickland*, *T. P.*, & *Farmer*, *J. T.* Cn. R. S. P. & T. 4 (1898) (Sect. 3) 59-.
- rectangular. *Boussinesq*, *J. C. R.* 114 (1892) 868-.
- sharp-edged, and impact of jet on vanes. *Farmer*, *J. T.* Cn. R. S. P. & T. 2 (1896) (Sect. 3) 45-.
- with short pipe. *Frizell*, *J. P.* Franklin I. J. 122 (1886) 287-.
- slit-shaped, theoretical determination. *Kötter*, *F.* Berl. Ps. Gs. Vh. (1887) 40-.
- especially superheated liquids at high pressures. *Nicoli*, *N.* Rm. R. Ac. Linc. Mm. 2 (1895) 108-.
- in thin wall. *Boussinesq*, *J. J.* de Ps. 1 (1892) 265-.
- — —, approximate calculation. *Boussinesq*, *J. C. R.* 114 (1892) 704-.
- — —, experiments. *Vautier*, *T. J.* de Ps. 8 (1889) 301-, 396-.
- — —, stream lines. *Tumlirz*, *O.* Wien Ak. Sb. 105 (1896) (Ab. 2a) 1024-.
- transition to flow over sill. *Hégly*, —. C. R. 122 (1896) 916-.
- velocity of molecules nearest orifice. *Niccolo*, *G.*, & *Pacinotti*, *L.* (vi Add.) II Cim. 4 (1846) 377-.
- in vessels filled partly with fluid, partly with air and closed at top. *Schäwen*, *P. von.* Carl Rpm. 18 (1882) 141-.
- — — of any form. *Prüll*, *R.* Civing. 20 (1874) 279-.
- Discontinuity of fluid motion. *Kelvin*, (Lord). Nt. 50 (1894) 524-, 549, 573-, 597-.
- — —. *Rausenberger*, *O.* [1896] D. Mth. V. Jbr. 5 (1901) (Heft 1) 93-.
- Discontinuous fluid motion. *Helmholtz*, *H.* Berl. Mb. (1868) 215-.
- — —. *Oberbeck*, *A.* A. Ps. C. 2 (1877) 1-.
- — —. *Basset*, *A. B.* [1894] Nt. 51 (1894-95) 11.
- — — in 2 dimensions, theory. *Love*, *A. E. H.* Camb. Ph. S. P. 7 (1892) 175-.
- — — involving sources and vortices. *Hopkinson*, *B. L.* Mth. S. P. 29 (1898) 142-.
- Diverging surfaces of water, experiments. *Caligny*, *A. de.* C. R. 46 (1858) 537-.
- Dynamics of gases, new experiment. *Parize*, —. Finist. S. Sc. Bll. 7 (Fasc. 1) (1885) 74-.
- Efflux and influx of gases. *Bauschinger*, *J.* Schlömilch Z. 8 (1863) 81-, 153-.
- — — liquid, reaction. *Zhukovskii*, *N. E.* (xn) Rs. Ps.-C. S. J. 14 (Ps.) (1892) [(Pt. 1)] 470-; Rec. Mth. (Moscou) 12 (1885) 787-; Fsch. Ps. (1886) (Ab. 1) 841-.
- , particular case. *Plateau*, *J. A. F.* Brux. Ac. Bll. 3 (1836) 145-.
- Equations of motion of jets. *Sautreaux*, *C.* Par. Ec. Norm. A. 10 (1893) (Suppl.) 95-.
- Experiments on jets. *Smith*, *F. H.* Am. J. Sc. 45 (1868) 419-.
- — — and induced currents. *Morton*, *A.* [1874] Glasg. Ph. S. P. 9 (1875) 179-.
- — — of steam. *Rosenhain*, *W.* I. CE. P. 140 (1900) 199-.
- — — at East Holywell Colliery. *Taylor*, *T. J.* N. Eng. I. Mn. E. T. 1 (1852-53) 208-.
- Figures produced by fall of water-drop with red lead in suspension. *Decharme*, *C. C. R.* 93 (1881) 408-.
- Form of free surface. *Raillet*, —. C. R. 61 (1865) 446-.
- — — in pipes with constant flow. *Colding*, *L. A.* Kjöb. Dn. Vd. Selsk. Skr. 6 (1867) 1-.
- — — prismatic pipe. *Colding*, *L. A.* Kjöb. Ov. (1861) 159-.
- — — surface of water flowing from vessel through central orifice. *Riccati*, *G.* Verona S. It. Mm. 3 (1786) 238-.
- Formation of drops in jet. *Buff*, *H.* Lieb. A. 78 (1851) 162-.
- Fountains, Trafalgar Square. *Amos*, *C. E.* (vi Add.) CE. I. P. 19 (1859-60) 21-.
- Free surface of moving fluid. *Oberbeck*, *A. A.* Ps. C. 39 (1890) 555-.
- Friction in free surfaces of fluids. *Oberbeck*, *A. A.* Ps. C. 11 (1880) 634-.
- Height of fine jet of water, influence of air on. *Mensbrugghe*, *G. van der.* Brux. Ac. Bll. 34 (1897) 248-.
- Hydraulic trajectories. *Martin de Brettes*, —. C. R. 67 (1868) 1103-; Les Mondes 18 (1868) 568-.

## IMPACT.

- Lagrange*, *J. L. de.* Turin Mm. Ac. 1 (1784-85) 95-.
- Michelotti*, *I.* Turin Mm. Ac. 4 (1788-89) 121-.
- Brunacci*, *V.* [1812-14] Mod. Mm. S. It. 16 (1813) 172-; 17 (1815) 79-.
- Avanzini*, *G.* [1815] Mod. Mm. S. It. 18 (1818) 19-.
- Taurinus*, *F. A.* Oken Isis 23 (1830) 546-.
- Bidone*, *G.* Tor. Mm. Ac. 40 (1838) 81-.
- (*Bidone*). *Richelmy*, *P.* [1856] Tor. Mm. Ac. 19 (1861) 133-.
- Buff*, *H.* A. Ps. C. 137 (1869) 497-.
- of air, combination with atmospheric pressure. *Hachette*, *J. N. P.* A. C. 35 (1827) 34-.
- — —. *Quetelet*, *L. A. J.* Quetelet Cor. Mth. 3 (1827) 92-.
- — — on cylinders and plates, optical investigation. *Mach*, *E.*, & *Salcher*, *P.* Wien Ak. Sb. 93 (1890) (Ab. 2a) 1303-.
- — —, optical investigation. *Mach*, *L.* Wien Ak. Sb. 106 (1897) (Ab. 2a) 1025-.
- continuous, on plane surfaces. *Lorgna*, *A. M.* Verona S. It. Mm. 4 (1788) 418-.



- on curved vanes. *Church, I. P.* [1879] *V. Nost. Eng. Mg.* 22 (1880) 210-.
- determination by water wheel. *Nordmark, Z.* *Stockh. Ak. Hndl.* 34 (1813) 1-.
- of isolated jets, etc. *Arzberger, J.* *Gilbert A.* 44 (1813) 430-.
- — — of air and water, experiments. *Weisbach, J.* *Civing.* 8 (1862) 1-.
- — — — — of Weisbach. *Zeuner, G.* *Civing.* 1 (1854) 1-.
- — — — —, — — —. *Ebert, F.* *Civing.* 7 (1861) 262-.
- opposite jets. *Savart, F.* *A. C.* 55 (1833) 257-.
- phenomenon. *Morosi, G.* *Mil. Mm. I. Lomb. Ven.* 1 (1812-13) 119-, 305-.
- on plane. *Pacinotti, L., Gianni, A., & Cocchi, O.* *N. Cim.* 1 (1855) 265-.
- — —. *Hirn, G. A.* *Les Mondes* 54 (1881) 192-.
- — —, circular. *Savart, F.* *A. C.* 54 (1833) 55-, 113-.
- — —, — (Savart). *Boussinesq, J. C. R.* 69 (1869) 45-, 128-.
- — —, horizontal. *Popov, A. T.* (xii) *Kazan Un. Mm.* (1871) 239-.
- — —, Weisbach's theory. *Webb, J. B.* *Franklin I. J.* 124 (1887) 144-, 463-; 125 (1888) 31-.
- — —, — — —. *Smith, W. C., & Sheble, F.* *Franklin I. J.* 124 (1887) 257-.
- and resolution into drops. *Hagen, G. H. L.* *Pogg. A.* 78 (1849) 451-.
- of water on water. *Brunacci, V.* *Brugnatelli G.* 10 (1817) 339-.
- Intermittence of jet. *Caligny, A. de.* *Par. S. Phlm. PV.* (1848) 32-.
- Jet formed partly by current and partly by action of waves on 2 converging sea-walls. *Caligny, A. de.* *C. R.* 75 (1872) 186-.
- of steam and of compressed gas, comparative effects. *Bertin, É.* *Cherb. S. Sc. Nt. Mm.* 19 (1875) 319-; 20 (1876) 256-.
- — — through flame, invisible. *Nicholson, W.* *Nicholson J.* 12 (1805) 47-.
- Jets. *Hachette, J. N. P.* *A. C.* 3 (1816) 78-; 5 (1817) 52-.
- (Hachette). *Cauchy, A. L.* *Thomson A.* *Ph.* 10 (1817) 214-.
- of air, experimental study. *Weyher, C. C.* *R.* 104 (1887) 494-.
- Liquid jets. *Billet-Sélys, —.* *A. C.* 31 (1851) 326-.
- — —. *Poulain, A.* *Les Mondes* 11 (1866) 429-.
- — —. *Robinson, S. W.* *Franklin I. J.* 51 (1866) 371-.
- — —. *Rayleigh, (Lord).* [1879-82] *R. S. P.* 28 (1879) 406-; 29 (1879) 71-; 34 (1883) 130-.
- — —, examination by means of instantaneous light. *Matteucci, C. C. R.* 22 (1846) 260.
- — — under gravity. *Sharpe, H. J.* [1891] *Camb. Ph. S. P.* 7 (1892) 264-.
- — — and produced vortices. *Breton, P.* *Les Mondes* 37 (1875) 316-.
- Liquid jets and surface tension. *Piccard, J.* *Arch. Sc. Ps. Nt.* 24 (1890) 579-.
- Motion of falling spray. *Jenkin, A.* *Nt.* 58 (1898) 460.
- — — fluid stream over wavy bed. *Voigt, W.* *Gött. Nr.* (1892) 490-.
- — — gravitating fluid when surfaces of discontinuity are formed. *Bervi, N.* *Mosc. S. Sc. Bil.* 83 (No. 2) (1894) 44-; 91 (No. 1) (1894) 49-; *Fsch. Ps.* (1895) (Ab. 1) 365-.
- — — liquid drops. *Gromeka, I. S.* *Kazan S. Nt. (Ps.-Mth.) P.* 5 (1887) 8-.
- — — at free surface, law of permanence of molecules. *Piola, G.* *Mil. G. I. Lomb.* 3 (1842) 368-.
- — — of surface of separation of 2 fluids. *Reynolds, O.* *Manch. Lt. Ph. S. Mm. & P.* 9 (1895) 167-.
- — — water surface. *Caligny, A. de.* *L'I.* 26 (1858) 51-.
- Nozzle as accurate water meter. *Freeman, J. R.* *Am. S. CE. T.* 24 (1891) 492-.
- Observation of jets by Geissler's tubes. *Izarn, —.* *C. R.* 106 (1888) 543-.
- Passage of mercury through liquids. *Royer, E.* [1880] *Bordeaux S. Sc. Mm.* 4 (1882) 259-.
- Perpendicular jet, theory. *Popov, A.* *St. Pet. Ac. Sc. Mm. (Rs.)* 15 (\*1869) 265-; 17 (\*1870) 99-.
- Phenomena of water-jet. *Tyndall, J.* *Ph. Mg.* 1 (1851) 105-.
- Photograph of liquid jet. *Chamantov, N. N.* *Rs. Ps.-C. S. J.* 22 (P3.) (1890) 84-, 281-; *J. de Ps.* 10 (1891) 434, 594.
- Photography of liquid jets. *Bazzi, E. N.* *Cim.* 19 (1886) 277-.
- Plateau's experiments on jets. *Mensbrugghe, G. van der.* *Rv. Quest. Sc.* 46 (1899) 209-.
- Pulsation of jets and absorbing power of streams. *Robinson, G. R. S. P.* 5 (1844) 510-.
- Reaction of jet. *Grünberg, T.* [1894] *Riga Cor.-Bl.* 38 (1895) 63-.
- Rotary motion in liquid jets. *Magnus, G. A.* *C.* 63 (1861) 362-.
- Rotation in jets, effects. *Tait, P. G.* [1881] *Edinb. R. S. P.* 11 (1882) 94.
- Slipping at boundary of moving fluid. *Whetham, W. C. D.* [1890] *Phil. Trans. (A)* 181 (1891) 559-.
- Stream lines, free. *Kirchhoff, G.* *Crelle J.* 70 (1869) 289-.
- — —, under action of forces. *Bervi, N. V.* [1896] *Mosc. S. Sc. Bil.* 93 (No. 1) (1897) 1-; *Fsch. Mth.* (1897) 687-.
- — —, — — —, theory. *Michell, J. H.* [1890] *Phil. Trans. (A)* 181 (1891) 389-.
- — — under gravitation. *Réthy, M.* [1896] *Mth. Termt. Éts.* 15 (1897) 342-; *Mth. Nt. B.* *Ung.* 15 (1899) 258-.
- — — in incompressible fluid pouring on plate. *Čaplygin, S. A.* *Mosc. S. Sc. Bil.* 96 (No. 1) (1899) 35-; *Fsch. Mth.* (1899) 684.
- Suction of air by current of water. *Colladon, —.* [1890] *Gen. S. Ps. Mm.* 31 (1890-93) liv.



- Suction by jet. *Gherardi, S.* [1839] Bologna N. Cm. 5 (1842) 277-.
- — — *Caligny, A. de.* C. R. 56 (1863) 655-.
- — — of air. *Weber, W. E.* Schweigger J. 53 (= *Jb.* 23) (1828) 304-.
- Surface conditions in hydrodynamics. *Petrini, H.* Ups. S. Sc. N. Acta 15 (1895) No. 12, 8 pp.
- — — of moving fluid. *Girault, C.* C. R. 43 (1856) 48-.
- Theory of jets. *Voigt, W.* Gött. Nr. (1885) 285-.
- — —, *Bernard. Bonati, T.* Mod. Mm. S. It. 15 (1811) 226-.
- — — steam jet-blower. *Reichenbach, R. von.* Wien Berg-Hm. Jb. 23 (1875) 322-.
- Upward jets of Niagara. *Barlow, W. H.* B. A. Rp. (1877) (Sect.) 199-.

## VENA CONTRACTA.

- Bidone, G.* [1822-38] Tor. Mm. Ac. 27 (1823) 83-; Mod. Mm. S. It. 20 (1828) 536-; Tor. Mm. Ac. 34 (1830) 363-; 40 (1838) 1-.
- Buff, H.* Pogg. A. 46 (1839) 227-.
- Schofka, F. O.* Baumgartner Z. 6 (1840) 384-.
- (*Schofka.*) *Weisbach, J.* Baumgartner Z. 7 (1840) 111 [121]-.
- Baeyer, J. J.* C. R. 18 (1844) 85-.
- Girard, P. S.* J. Gén. Civ. 11 (1846) 29-.
- Weisbach, J.* Ing. 2 (1850) 361-.
- Estocquois, T. d'.* [1862] (xii) Doubs S. Mm. 7 (1864) 107-.
- Hanlon, G. O.* [1869] L. Mth. S. P. 3 (1869-71) 4-.
- (*Hanlon.*) *Maxwell, J. C.* [1869] L. Mth. S. P. 3 (1869-71) 6-.
- Froude, W.* [1876] Glasg. Ph. S. P. 10 (1877) 145-.
- Thomson, (Prof.) Jas.* [1876] Glasg. Ph. S. P. 10 (1877) 149-.
- Napier, R. D.* [1876] Glasg. Ph. S. P. 10 (1877) 154-.
- Rayleigh, (Lord).* Ph. Mg. 2 (1876) 441-.
- Collignon, É.* A. Pon. Chauss. 9 (1885) 295-.
- Hugoniot, —.* C. R. 103 (1886) 1178-.
- Provenzali, F. S.* Rm. N. Linc. At. 40 (1887) 51-.
- Sharpe, H. J.* Camb. Ph. S. P. 7 (1892) 4-; 111-.
- application of Venturoli's theory of efflux. *Brighenti, M.* (vi *Adds.*) N. A. Sc. Nt. 8 (1847) 25-.
- and distribution of velocity within jets. *Bazin, —.* C. R. 118 (1894) 1031-.
- experiments. *Richelmy, P.* [1852] Tor. Mm. Ac. 14 (1854) 275-.
- — — *Gaukler, P. H.* Les Mondes 10 (1866) 475-.
- — — with Venturi's apparatus. *Eytelwein, J. A.* Gilbert A. 7 (1801) 295-.
- of gaseous jet, modification of adiabatic relation presented by. *Parenty, H.* C. R. 113 (1891) 791-.

- of gaseous jet, pressure in. *Hugoniot, —.* C. R. 103 (1886) 241-.
- — —, — — —. *Hirn, —.* C. R. 103 (1886) 371.
- orifices slit-shaped or circular. *Kötter, F.* Arch. Mth. Ps. 5 (1887) 392-.
- scale. *Zeuner, G.* Civing. 2 (1856) 53-.
- theoretical investigation. *Rudberg, F.* Stockh. Ak. Hndl. (1822) 1-.
- theory. *Bayer, J.* Crelle J. Bauk. 25 (1847) 131-.
- $$V = \frac{\pi \delta h r^4}{8 \mu l} \left( 1 + 4 \frac{\mu}{\lambda r} \right).$$
 *Kraevič, K.* Rs. Ps. C. S. J. 16 (Ps.) (1884) 178-, 510-.
- — —. *Petrov, N. P.* Rs. Ps.-C. S. J. 16 (Ps.) (1884) 272-; 17 (Ps.) (1885) 20-.

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- Touche, (le lt.-col.) P. E. Aër.* (1893) 54-.
- Jäger, G. Wien Ak. Sb.* 106 (1897) (*Ab.* 2a) 1118-.
- of air to pendulum. *Stamkart, F. J. Amst. Vh.* 1 (1849) 217-.
- — — — — *Deforges, G. C. R.* 112 (1891) 217-.
- — — — —, determination. *Savitsch, A. [1865] St Pét. Ac. Sc. Bll.* 9 (1866) 477-.
- — — — — slow oscillations. *Baillie, J. B. Par. Éc. Pol. J. cah.* 52 (1882) 211-; *C. R.* 96 (1883) 1493-.
- to cylinder moving in direction perpendicular to its axis. *Boussinesq, J. C. R.* 100 (1885) 974-.
- elastic sphere. *Leray, —. Les Mondes* 23 (1870) 359-.
- floating bodies. *Russell, J. S. B. A. Rp.* (1834) 531-; (1835) (*pt.* 2) 16.
- — — due to form and to friction of wetted surface. *Colthurst, J. (vi Adds.) CE. I. P.* 23 (1863-64) 339.
- of gases to pendulum. *Defforges, G. C. R.* 112 (1891) 380-.
- and impact. *Fossombroni, V. Mod. S. It. Mm.* 9 (1802) 585-.
- Juan's law. *Avanzini, G. Bologna Mm. I. It.* 2 (1808) (*pte.* 1) 241-; 2 (1810) (*pte.* 2) 59-, 321-.
- observations on Poncelet's theory. *Richelmy, P. Tor. Ac. Sc. At.* 13 (1877) 730-.
- to 2 oscillating spheres. *Stokes, G. G. B. A. Rp.* (1847) (*pt.* 2) 6.
- plane immersed in fluid. *Soreau, R. As. Fr. C. R.* (1899) (*Pt.* 1) 164.
- — moving obliquely. *Osengu, G. At. Sc. It.* (1846) 296-.
- — — uniformly. *Ciolkovskij, K. Mosc. S. Sc. Bll.* 73 (*No.* 2) (1891) 13-; *Fschr. Ps.* (1891) (*Ab.* 1) 254.
- relation to velocity. *Creighton, H. Tilloch Ph. Mg.* 49 (1817) 346.
- — — — — *Heppel, J. M. (vi Adds.) CE. I. P.* 5 (1846) 266-.
- to slow motion. *Coulomb, C. A. Par. Mm. de l'I.* 3 (1800) 246-.
- sphere for small motions. *Boussinesq, J. C. R.* 100 (1885) 935-.
- surface. *Geoffroy, L. Par. Éc. Norm. A.* 7 (1878) 215-.
- theory. *Nordmark, Z. Stockh. Ak. Hndl.* 26 (1805) 145-.
- *Tredgold, T. Ph. Mg.* 3 (1828) 249-.
- of water. *Beaufoy, M. Thomson A. Ph.* 3 (1822) 276-.
- — — — — *Phipps, G. H. CE. I. P.* 23 (1863-64) 321-.
- — — — — to floating and to immersed bodies. *Brit. Ass. Comm. B. A. Rp.* 35 (1865) 56-; 36 (1866) 148-.
- — — — — — — — — — — *Rankine, W. J. M. B. A. Rp.* 36 (1866) (*Sect.*) 147-.
- — — — — — — — — — —, experiments, 1793-98. *Beaufoy, M. Thomson A. Ph.* 3 (1814) 42-.
- — — — — — — — — — — of Beaufoy. *Prechl, J. J. Wien Jb. Pol. I.* 11 (1827) 56-.

- Running water, power of holding matters in suspension. *Frizell, J. P. Franklin I. J.* 76 (1878) 177-.
- Sliding of fluid in contact with solid, electric endosmose. *Lamb, H. B. A. Rp.* (1887) 495-.
- Sphere. *Basset, A. B. [1887] Phil. Trans. (A)* 179 (1889) 43-.
- *Allen, H. S. Ph. Mg.* 50 (1900) 323-, 519-.
- Spherical and cylindric motion. *Röhrs, J. H. (xi) L. Mth. S. P.* 5 (1873-74) 125-.
- — — — — (Röhrs). *Maxwell, J. C. (x) L. Mth. S. P.* 5 (1873-74) 138-.
- Stream lines due to motion of ellipsoid. *Herman, H. A. QJ. Mth.* 23 (1889) 378-.
- Subsidence of fine particles in liquids. *Barus, C. U. S. Gl. Sv. Bll. No.* 36 (1886) 51 pp.; *No.* 60 (1890) 139-.
- Surface friction of water on cylinder. *Rawson, R. B. A. Rp.* (1849) (*pt.* 2) 3-.
- — — — — plane. *Froude, W. B. A. Rp.* 42 (1872) 118-.
- Torsional oscillations of solid. *Couette, —. C. R.* 105 (1887) 1064-.
- vibrations of sphere with air-resistance. *Lampel, A. Wien Ak. Sb.* 93 (1886) (*Ab.* 2) 291-.
- Viscous fluid motion around sphere, second approximations to. *Whitehead, A. N. QJ. Mth.* 23 (1889) 143-.

## 2510 Regular flow of viscous fluids in pipes, etc.

- Graetz, L. Z. Mth. Ps.* 25 (1880) 316-, 375-.
- Greenhill, A. G. [1881] L. Mth. S. P.* 13 (1881-82) 43-.
- Air. *Spiller, J. Aër. S. Rp.* 6 (1871) 15-.
- *Hoffmann, P. A. Ps. C.* 21 (1884) 470-.
- , gauging of flow. *Blanc, F. C. R.* 32 (1851) 807-.
- in long pipes. *Unwin, W. C. I. CE. P.* 63 (1881) 297-.
- Capillary siphons with electrified and with heated liquids. *Cornubiensis [Pseud.]. (vi Adds.) Tilloch Ph. Mg.* 42 (1813) 202-.
- Flow in capillary tubes. *Girard, P. S. Par. Mm. Ac. Sc. I* (1816) 187-, 260-.
- — — — — *Tait, P. G. [1873] (xi) Edinb. R. S. P.* 8 (1875) 208-.
- — — — — *Guerout, A. C. R.* 78 (1874) 351-.
- — — — — *Colson, A. C. R.* 113 (1891) 740-.
- — — — —, coefficient. *Guerout, A. C. R.* 81 (1875) 1025-; 83 (1876) 1291-.
- — — — —, influence of temperature. *Girard, P. S. Par. Mm. de l'I.* (1813-15) 249-; *Par. Mm. Ac. Sc. I* (1816) 187-, 260-.
- — — — — *Guerout, A. C. R.* 79 (1874) 1201-.
- of gases through capillary tubes at low pressures. *Rossander, G. Fschr. Ps.* (1900) (*Ab.* 1) 227.
- — — — — small orifice at different temperatures. *Timofejew, W. Z. Ps. C.* 6 (1890) 586-.

## 2520 Viscous Flow in Pipes

- Fluid motion, two manners of. *Reynolds, O.* R. I. P. 11 (1887) 44-.
- Friction coefficient. *Masoni, U.* Nap. I. Inc. At. 10 (1897) No. 6, 8 pp.
- for rivetted steel pipe. *Hawks, A. McL.* Am. S. CE. T. 42 (1899) 155-.
- of steam. *Carpenter, R. C., & Sickles, E. G.* Sc. Abs. 2 (1899) 638-.
- of fluids in channels or prismatic tubes. [Barré de] *Saint-Venant, —.* Par. S. Phlm. PV. (1846) 49-.
- Gases, limiting velocity. *Hugoniot, —.* Par. S. Ps. Sé. (1886) 120-.
- Incompressible fluid. *Tumlirz, O.* Wien Ak. Sb. 85 (1882) (Ab. 2) 133-.
- Lateral pressure, alteration on sudden narrowing of tube. *Hürthle, K.* Pflüg. Arch. Pl. 82 (1900) 443-.
- Length of tubes, influence on quantity of liquid traversing them in given time. *Poiseuille, J. L. M.* Par. S. Phlm. PV. (1838) 77-.
- Mercury in capillary tubes. *Villari, E.* Bologna Ac. Sc. Mm. 6 (1875) 487-.
- Motion of gases in ducts and towers. *Jurisch, K. W.* S. C. In. J. 13 (1894) 513-.
- New problem. *Kobald, E.* Wien Ak. Sb. 96 (1888) (Ab. 2) 592-.
- Stationary currents. *Helmholtz, H.* [1868] Heidl. Vh. Nt. Md. 5 (1871) 1-.
- Uniform flow of liquid. *Moseley, H.* R. S. P. 19 (1871) 286-; Ph. Mg. 42 (1871) 184-, 349-; 44 (1872) 30-.
- motion in circular tubes, 2nd approximation. *Boussinesq, J.* C. R. 123 (1896) 141-.
- Verification of Navier's equations. *Couette, —.* Par. S. Ps. Sé. (1889) 60-, 103-.
- Water in cylindrical, almost horizontal pipes. *Hagen, G. H. L.* Berl. Ab. (Mth.) (1869) (2) 1-.
- , influence of temperature on flow. *Hagen, G. H. L.* [1853-54] Berl. Ab. (1854) (Mth.) 17-.
- in straight pipe. *Rudski, M. P.* Ph. Mg. 35 (1893) 439-.

## 2520 Stability and instability of perfect and of viscous fluid motions. Turbulent motion.

### ACTION OF OIL ON WAVES.

- Otto, J. F. W.* Tilloch Ph. Mg. 4 (1799) 225-.
- Lipkens, —.* C. R. 16 (1843) 684-.
- Virlet d'Aoust, P. T.* C. R. 95 (1882) 797-.
- Bourgeois, S.* C. R. 95 (1882) 1152-.
- Aitken, J.* [1883] Edinb. R. S. P. 12 (1884) 56-.
- Boulin, P.* Rv. Sc. 33 (1884) 255.
- Mancini, E.* N. Antol. Sc. 78 (1884) 273-.
- Vivier, A.* Charente-Inf. S. Sc. A. 20 (1884) 509-.
- Anon.* Am. Met. J. 1 (1884-85) 514-.
- Wead, C. K.* Science 7 (1886) 214-.
- Wyckoff, A. B.* Am. Ph. S. P. 23 (1886) 383-.

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- Anon.* [1886] Wetter 3 (1887) 38-.
- Cloué, G.* C. R. 104 (1887) 1586-; A. Hydrog. 9 (1887) 173-.
- Mensbrugghe, G. van der.* Brux. Ac. Bll. 14 (1887) 205-.
- Richet, C.* Rv. Sc. 40 (1887) 698-.
- Rottok, —.* A. der Hydrog. 15 (1887) 291-.
- Kuhlmann, —.* A. der Hydrog. 15 (1887) 416.
- Drigalski, E. von.* A. der Hydrog. 15 (1887) 416-.
- Anon.* A. der Hydrog. 15 (1887) 461-.
- Geiseler, —.* A. der Hydrog. 15 (1887) 516.
- Townsend, T. F.* Franklin I. J. 124 (1887) 42-.
- Labraque-Bordenave, —.* Bordeaux Ac. Act. 49 & 50 (1888) 5-.
- Marshall, W. P.* Midl. Ntlist. 11 (1888) 170-, 207-.
- Mensbrugghe, G. van der.* Brux. Ac. Bll. 15 (1888) 263-.
- Seemann, K. H.* Wetter 5 (1888) 239-.
- Rimpau, W.* Wetter 5 (1888) 233.
- Schmid, A.* Wetter 5 (1888) 283-; 6 (1889) 24.
- Anon.* A. der Hydrog. 16 (1888) 103-.
- Schienenmann, J.* A. der Hydrog. 16 (1888) 281-.
- Anon.* A. der Hydrog. 16 (1888) 369-.
- Barandom, —.* A. der Hydrog. 16 (1888) 457.
- Schulze, —.* A. der Hydrog. 16 (1888) 499.
- Pawelz, —.* A. der Hydrog. 16 (1888) 499-.
- Weinberg, J.* [1889] Mosc. S. Nt. Bll. 2 (1889) 618-; 3 (1890) (Prot.) 8-.
- Anon.* A. der Hydrog. 17 (1889) 86.
- Ascher, —.* A. der Hydrog. 18 (1890) 81.
- Beynon, R.* Nt. 41 (1890) 205-.
- Basset, A. B.* Nt. 41 (1890) 297.
- Freeman, —.* A. der Hydrog. 18 (1890) 116.
- Anon.* A. der Hydrog. 18 (1890) 240.
- Anon.* A. der Hydrog. 18 (1890) 281-.
- Kampehl, O.* A. der Hydrog. 18 (1890) 330-.
- Grönn, A.* A. der Hydrog. 18 (1890) 466.
- Anon.* A. der Hydrog. 19 (1891) 256.
- Anon.* A. der Hydrog. 19 (1891) 339.
- Deutsche Seewarte.* A. der Hydrog. 19 (1891) 375-.
- Anon.* A. der Hydrog. 19 (1891) 379-.
- Cuverville, J. M. A. C. de.* A. Hydrog. 14 (1892) 18-.
- Klimpert, R.* Wetter 9 (1892) 259-, 283-; 10 (1893) 21-, 45-, 64-, 90-.
- Anon.* A. der Hydrog. 20 (1892) 65-.
- Schulz, A.* A. der Hydrog. 20 (1892) 108.
- Grünevald, C.* A. der Hydrog. 21 (1893) 310-.
- Deutsche Seewarte.* A. der Hydrog. 22 (1894) 388-.
- Pockels, A.* Nt. 50 (1894) 223-.
- Henking, —.* [1895] Hann. Jbr. (1893-97) 58-.
- Schumacher, D.* A. der Hydrog. 23 (1895) 467.
- Baretge, —.* C. R. 124 (1897) 253-; As. Fr. C. R. (1897) (Pt. 1) 183-.
- Christiansen, J.* A. der Hydrog. 27 (1899) 263.
- Debrosse, E.* Rv. Mar. et Col. 147 (1900) 212-, 422-.
- and experiment with soapy water. *Gathemann, H.* A. der Hydrog. 26 (1898) 218-.
- history. *Beek, A. van.* A. C. 4 (1842) 257-.



- passage in Plutarch. *Baldassini, F.* A. Sc. Lomb. Ven. 12 (1842) 83-, 89-.
- and of soapy water. *Köppen, W.* A. der Hydrol. 21 (1893) 134-.
- wave motion. *Rosenbach, —.* Bresl. Schl. Gs. Jbr. (1894) (Ab. 2a) 59-.
- Breaking of jet, phenomena. *Lullin, T.* Arch. Sc. Ps. Nt. 2 (1896) 201-.
- Calming of waves by soapy water. *Deutsche Seewarte.* A. der Hydrol. 21 (1893) 323-.
- — — — — *Köppen, W.* A. der Hydrol. 24 (1896) 136-.
- — — — —, experiments. *Deutsche Seewarte.* A. der Hydrol. 22 (1894) 232-; 23 (1895) 164-.
- — —, theory. *Meyer, G.* A. der Hydrol. 22 (1894) 144.
- — —, —. *Richter, M. M.* A. der Hydrol. 22 (1894) 250-.
- Combined streams, mathematical theory. *Rankine, W. J. M.* [1870] R. S. P. 19 (1871) 90-.
- Convection-currents. *Bénard, H.* Par. S. Ps. Sé. (1900) 202-.
- Dynamical theory of incompressible viscous fluids, and criterion. *Reynolds, O.* [1894] Phil. Trans. (A) 186 (1896) 123-.
- Efflux and influx of elastic fluids at variable pressures. *Fliegner, A.* Zür. Vjschr. 19 (1874) 272-.
- Explosions, theory. *Threlfall, R.* Ph. Mg. 21 (1886) 165-.
- Formation of drops in liquid stream, experiment and apparatus. *Busset, P.* [1890] Laus. S. Vd. Bll. 26 (1891) xvii.
- Geyser apparatus, experiments with G. Wiedemann's. *Ebert, H.* A. Ps. C. 63 (1897) 342-.
- Gyration of liquid masses flowing from orifice in base of cylinder. *Laroque, F.* C. R. 51 (1860) 758-; A. C. 61 (1861) 345-; 67 (1863) 484-.
- — — in rotation, experiments. *Osborne, J. W.* Am. As. P. (1876) 60-.
- Hydrodynamic phenomena of mixed turbid and clean waters. *Ribaucour, A.* As. Fr. C. R. (1885) (Pt. 2) 252-.
- Instability of cylinder of viscous liquid under capillary force. *Rayleigh, (Lord).* Ph. Mg. 34 (1892) 145-, 177-.
- — fluid motions. *Rausenberger, O.* D. Nf. Vh. (1896) (Th. 2, Hälfte 1) 41-.
- — jets. *Rayleigh, (Lord).* L. Mth. S. P. 10 (1878-79) 4-.
- Internal current of fluids. *Heller, Á.* Term. Közl. 20 (1888) (Suppl.) 171-.
- Liquid passing through another without mixing. *Morisot, —.* Bordeaux S. Sc. Mm. 2 (1886) li-.
- Oil and water, agitation of common surface observed by Franklin. *Wall, M.* [1784] Manch. Ph. S. Mm. 2 (1789) 435-.
- — — — — *Patterson, R.* [1787] Am. Ph. S. T. 3 (1793) 13-.
- — — — — *Robinet, (Prof.)* —. J. de Ps. 65 (1807) 277-.
- Oil and water, agitation of common surface observed by Franklin, Robinet's explanation. *Bellani, A.* Brugnattelli G. 1 (1808) 257-.
- — —, supposed surface attraction. *Dispan, P.* A. C. 57 (1806) 14-.
- — — — — *Carradori, G.* A. C. 62 (1807) 65-.
- Oscillations of water in pipe. *Caligny, A. de.* Liouv. J. Mth. 6 (1841) 89-.
- Resolution of liquid cylinders into drops. *Hagen, G. H. L.* Berl. B. (1849) 281-.
- — — — — *Plateau, F.* Brux. Ac. Bll. 24 (1867) 21-.
- Rotational oscillations of fluid cylinders. *Margules, M.* Wien Ak. Sb. 85 (1882) (Ab. 2) 343-.
- Splash of drop and allied phenomena. *Worthington, A. M.* [1894] R. I. P. 14 (1896) 289-.
- Stability of flow of fluids. *Rayleigh, (Lord).* Ph. Mg. 34 (1892) 59-.
- — fluid motion. *Thomson, (Sir) W.* Edinb. R. S. P. 14 (1888) 359-.
- — frictionless liquid. Theory of critical planes. *Basset, A. B.* Mth. A. 48 (1897) 89-.
- — or instability of certain fluid motions. *Rayleigh, (Lord).* [1880-95] L. Mth. S. P. 11 (1879-80) 57-; 19 (1889) 67-; 27 (1896) 5-.
- — — — —, examples of Lord Rayleigh's theory. *Love, A. E. H.* L. Mth. S. P. 27 (1896) 199-.
- — — viscous fluids. *Basset, A. B.* [1892] R. S. P. 52 (1893) 273-.
- of motion. Broad river flowing down an inclined plane bed. *Thomson, (Sir) W.* Ph. Mg. 24 (1887) 272-.
- and small oscillations of liquid full of nearly straight coreless vortices. *Thomson, (Sir) W.* [1889] Ir. Ac. P. 1 (1889-91) 340-.
- of steady and of periodic fluid motion. *Thomson, (Sir) W.* Ph. Mg. 23 (1887) 459-.
- Stationary motion of incompressible viscous fluid. *Korteweg, D. J.* [1882] Amst. Ak. Vs. M. 18 (1883) 343-; Ph. Mg. 16 (1883) 112-.
- Steady motion of fluids, conditions for. *Popov, A. T.* (xii) Kazan Un. Mm. (1850) (Bk. 1) 20-.
- — — — — *Lamb, H.* L. Mth. S. P. 9 (1877-78) 91-.
- — —, property. *Salvert, F. de.* C. R. 60 (1865) 1153-.
- — incompressible fluids. *Stokes, G. G.* Camb. Ph. S. T. 7 (1842) 439-, 465.
- — viscous incompressible fluid. *Brill, J.* Camb. Ph. S. P. 8 (1895) 313-.
- Stream line surfaces. *Rankine, W. J. M.* Nv. Archt. T. 11 (1870) 175-.
- Thermodynamic acceleration and retardation of streams. *Rankine, W. J. M.* Ph. Mg. 40 (1870) 288-.
- Turbulent liquid, energy per cubic centimetre when transmitting laminar waves. *Fitzgerald, G. F.* B. A. Rp. (1899) 632-.
- —, propagation of laminar motion through. *Thomson, (Sir) W.* Ph. Mg. 24 (1887) 342-.
- motion, friction external. *Boussinesq, J.* C. R. 122 (1896) 1445-.



- Turbulent motion, friction internal. *Boussinesq, J.* C. R. 122 (1896) 1517-.
- in viscous liquids. *FitzGerald, G. F.* [1889] *Dubl. S. Soc. P.* 6 (1888-90) 289.
- and steady efflux of fluids. *Couette, M.* J. de Ps. 9 (1890) 414-.
- — — motion, stage intermediate between. *Boussinesq, J.* C. R. 125 (1897) 69-.
- streams, propagation of waves in, with reference to Boussinesq's formulæ, experiments. *Bazin, —.* C. R. 100 (1885) 1492-.
- vortex flow of liquids in pipes and open channels. *Boussinesq, J.* C. R. 122 (1896) 1289-.
- — — motion, formulæ for mean local pressures. *Boussinesq, J.* C. R. 122 (1896) 1369-.
- Unsteady motion of viscous liquids in capillary tubes. *Wolff, H. C.* Wisc. Ac. T. 12 (1900) 550-.
- Vibrating dams, phenomena. *Edwards, W.* Bost. P. N. H. S. 7 (1859-61) 153-.
- Vibrations of fall over dam at Holyoke, Mass. *Snell, E. S.* Am. As. P. (1857) 110-; (1859) 204-.
- liquid in cylindrical vessel. *Rayleigh, (Lord).* Nt. 12 (1875) 251.
- water falling over dams. *Stodder, C.* Bost. P. N. H. S. 6 (1856-59) 264-.
- — — — — cause. *Edwards, W.* Bost. P. N. H. S. 6 (1856-59) 327-, 338-.
- Vibratory movements accompanying flow of gases and liquids. *Maurat, J.* Rv. Cours Sc. 6 (1869) 490-.

## 2530 Measurement of fluid pressure. Measurement of fluid velocity.

(See also 2830, Physics 0835, and Meteorology 0310, 0312, 0314.)

- Action of powder in gun, theoretical determination. *Wrede, F. J.* Stockh. Ak. Hndl. 10 (1871) No. 1, 42 pp.
- Air meter, integrating. *Morin, A.* C. R. 54 (1862) 232-.
- for measuring draught for furnaces. *Kallstenius, G. S.* Stockh. Ak. Hndl. (1820) 260-; *Karsten Arch. Bergbau* 5 (1822) 345-.
- — — — — velocity of air in flues and chimneys. *Fletcher, A. E.* B. A. Rp. 37 (1867) (Sect.) 33-; 39 (1869) (Sect.) 48-; *Lpool. Lt. Ph. S. P.* 24 (1870) 31-.
- — — — — mines, etc. *Combes, C.* A. Mines 13 (1838) 103-.
- Barometer, mathematical theory of oscillations. *Liais, E.* Cherb. Mm. S. Ac. (1852) 97-.
- Compressibility of gases. *Akin, C. K.* Ph. Mg. 25 (1863) 289-.
- Compression of gases. *Despretz, C.* A. C. 34 (1827) 335-.
- liquids. *Despretz, C.* C. R. 21 (1845) 216-.

- Dubuat's paradox on solid in moving fluid and vice versa. *Žukovskij, N. E.* Mosc. S. Sc. Bll. 73 (No. 1) (1891) 21-; *Fsehr. Ps.* (1891) (Ab. 1) 253-.
- Efflux of air, experiments. *Wilde, H.* Manch. Lt. Ph. S. Mm. 10 (1887) 182-.
- Elastic after-effect in spring barometer. *Reinhertz, C.* Z. Instk. 7 (1887) 153-, 189-.
- Expansive power of compressed air compared with that of powder gas. *Borkenstein, F.* Mg. Ntvd. 8 (1828) 121-.
- Flow of fluid down inclined plane. *Seddon, J. A.* [1888] *St. Louis Ac. T.* 5 (1892) xxvii-.
- — — gases. *Reynolds, O.* [1885] *Manch. Lt. Ph. S. Mm.* 10 (1887) 164-.
- — — — — constant. *Hugoniot, H.* C. R. 102 (1886) 1545-; *A. C.* 9 (1886) 375-.
- Gas meter, wet. *Ullherr, J. C.* Dingler 165 (1862) 259-; 166 (1862) 112-.
- — — — — at constant level. *Moors, B. P.* Delft Ec. Pol. A. 4 (1888) 163-; 5 (1889) 139-.
- — — — — meters. *Elser, R. W.* (vi Adds.) *Berl. Pol. Ga. Vh.* 17 (1856) 61-.
- — — — — apparatus for gauging. *Ruhlmann, —.* Dingler 155 (1860) 337-.
- — — — — improved method of maintaining just water level. *Sanders, G.* *Dubl. R. S. J.* 1 (1856-57) 32-.
- — — — — improvements. *Abria, —.* *Bordeaux Act.* (1850) 509-.
- — — — — regulation of pressure. *Cavaillé-Coll, A.* C. R. 56 (1863) 339-.
- Gasometer with uniform pressure. *Stevens, J.* *Tilloch Ph. Mg.* 24 (1806) 163-; 27 (1807) 34-.
- Impact of water on plane surface, Weisbach's theory. *Smith, W. C., & Sheble, F.* *Franklin I. J.* 124 (1887) 257-.
- Instrument to measure force of blast in bellows, etc. *Banks, —.* [1800] *Manch. S. Mm.* 5 (1802) 398-.
- — — — — — — — — and experiments on flow of air from vessels. *Gilbert, L. W.* *Gilbert A.* 22 (1806) 286-.

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- Rettberg, E. F.* *Gilbert A.* 42 (1812) 99-.
- Russell, H.* *Tilloch Ph. Mg.* 63 (1824) 92-.
- Ziegler-Pellis, J.* *Act. S. Helv.* (1858) 128-.
- Silva-Pinto, M. V. da.* *Lisb. J. Sc. Mth.* 3 (1871) 239-.
- Yagn [Jagn], N.* [1876] (xii) *Mosc. S. Sc. Bll.* 39 [No. 2] (1880) 181-.
- Kraevich, K. D.* (xii) *Rs. C. Ps. S. J. 9* (Ps.) (1877) [(Pt. 1)] 252-.
- Bristol, W. H.* *Am. As. P.* (1888) 89-.
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- balance. *Schreiber, K. A. P.* (xii) *Z. Instk.* 1 (1881) 257-, 288-, 333-.
- bell. *Rateau, —.* *As. Fr. C. R.* (1892) (Pt. 1) 160.
- for blast-engines. *Nordenskiöld, N.* [1837] *St. Pét. Ac. Sc. Bll.* 3 (1838) 265-.
- Bourdon. Samuelson, A.* *Civing.* 7 (1861) 455-.
- *Worthington, A. M.* *Nt.* 41 (1890) 296.

- Bourdon. *Greenhill*, A. G. Nt. 41 (1890) 517-.
- , *Worthington*, A. M. Nt. 42 (1890) 125-.
- , *Rayleigh*, (Lord). Nt. 42 (1890) 197.
- , formulæ. *Résal*, H. A. Mines 11 (1867) 381-.
- , Tait, and Amagat gauges, comparison. *Barus*, C. Ph. Mg. 31 (1891) 400-.
- compensation, for air pressure. *Prytz*, K. Ts. Ps. C. 24 (1885) 129-, 224; *Fschr. Ps.* (1885) (Ab. 1) 391-.
- compressed air. *Machado*, V. [1882] *Lisb. J. Sc. Mth.* 9 (1883) 110-.
- , *Lussana*, S. N. Cim. 12 (1900) 237-.
- , general formulæ, and for stereometer. *Volpicelli*, P. *Tortolini* A. 8 (1857) 169-.
- , graduation. *Garnault*, E. (vii) A. Gén. Civ. 2 (1863) (pt. 2) 377-.
- construction and use. *Lemkes*, C. R. L. [1894] *Glasg. I. Eng. T.* 38 (1895) 15-.
- crusher, law of resistance of cylinder. *Vieille*, P. C. R. 114 (1892) 1468-.
- , measurement of pressure by. *Kellner*, W., & *Deering*, W. H. R. S. P. 57 (1895) 404-.
- , — of explosives by. *Sarrau*, —, & *Vieille*, —. C. R. 102 (1886) 1054-.
- data for use with. *Amagat*, E. H. C. R. 99 (1884) 1017-, 1153-.
- differential. *König*, A. C. Ztg. 13 (1889) 1159; *Dingler* 275 (1890) 513-.
- (König). *Kás*, A. *Oestr. Z. Brgw.* 38 (1890) 308-.
- (—). *Brown*, M. W. [1892] N. Eng. I. Mn. E. T. 41 (1893) 160-; 42 (1893) 50-.
- mercury. *Ravenek*, H. A. 's Gravenh. I. Ing. Ts. (1884-85) (Vh.) 1-.
- piston, for very high pressures. *Amagat*, E. H. C. R. 103 (1886) 429-.
- Edson self-recording. *Franklin Institute Comm.* Franklin I. J. 137 (1894) 241-.
- electric. *Deprez*, M. Par. S. Ps. Sé. (1879) 20-.
- , for small variations of pressure. *Richard*, G., & *Richard*, L. C. R. 112 (1891) 1559-.
- Kundt's. *Dvořák*, V. Wien Sb. 68 (1873) (Ab. 2) 7-.
- 2-liquid amplifying. *Grenier*, W. Laus. S. Vd. Bll. 13 (1874-75) 652-.
- differential. *Achard*, A. Arch. Sc. Ps. Nt. 49 (1874) 344-.
- McLeod gauge and air pumps. *Bertin*, A. A. C. 19 (1880) 231-.
- metallic, theory. *Marangoni*, C. (xii) Rv. Sc.-Ind. 12 (1880) 326-.
- micromanometer. *Smits*, A. Amst. Ak. Vs. 4 (1896) 145-, 198; 5 (1897) 292-; Arch. Néerl. 1 (1898) 97-.
- mirror. *Parragh*, G. Termt. Közl. 20 (1888) (Suppl.) 78-; Mth. Nt. B. Ung. 6 (1889) 408-.
- , *Kont*, G. Mth. Termt. Éts. 12 (1894) 277-.
- new method of reading. *Marek*, W. J. Carl Rpm. 16 (1880) 585-.
- open (Richard). *Combes*, C. A. Mines 7 (1845) 481-.
- , *Hemptinne*, A. D. de. Brux. Ac. Bll. 12 (1845) 541-.
- open, on Eiffel Tower. *Cailletet*, L. C. R. 112 (1891) 764-.
- , —, —. *Nansouty*, M. de. Gén. Civ. 18 (1890-91) 385-.
- , for high pressures. *Cailletet*, L. C. R. 84 (1877) 82-.
- , — low pressures. *Marnier*, A. *Dingler* 255 (1885) 471-.
- for high pressures. *Seaward*, S. *Tilloch Ph. Mg.* 63 (1824) 36-.
- , —. *Cailletet*, L. C. R. 83 (1876) 1211-; *Les Mondes* 42 (1877) 50-, 239-, 450-.
- , —. *Marié*, G. I. ME. P. (1880) 455-.
- , —. *Tait*, P. G. *Edinb. R. S. P.* 10 (1880) 572-.
- , —. *Thiesen*, M. F. (xii) Z. Instk. 1 (1881) 114-.
- , —. *Nansouty*, M. de. Gén. Civ. 9 (1886) 19-.
- low pressures of gas. *McLeod*, H. L. Ps. S. P. 1 (1876) 30-; Ph. Mg. 48 (1874) 110-.
- Rateau's, with magnified scale. *Hauer*, J. von. *Oestr. Z. Brgw.* 41 (1893) 5-.
- self-recording. *Giltay*, J. W. [1882] 's Gravenh. I. Ing. Ts. (1883) 95-.
- , for guns. *Vieille*, P. C. R. 112 (1891) 1052-.
- , for high pressures. *Minotti*, N. G. Ven. At. 5 (1846) 311-.
- , —, —. *Parenty*, H. C. R. 102 (1886) 811-; *Dingler* 264 (1887) 74-.
- sensitive. *Villard*, —. C. R. 116 (1893) 1187-.
- , —. *Charpentier*, P. C. R. 120 (1895) 439-.
- of simple construction. *Guglielmo*, G. Rv. Sc.-Ind. 25 (1893) 175-.
- spring, apparatus for testing. *Giltay*, J. W. Z. Instk. 5 (1885) 395-.
- standard. *Kamerlingh Onnes*, H. Amst. Ak. Vs. 8 (1900) 45-; Amst. Ak. P. 2 (1900) 29-.
- , mercury meniscus, correction. *Schalkwijk*, J. C. [1900-01] Amst. Ak. Vs. 9 (1901) 462-, 512-; Amst. Ak. P. 3 (1901) 421-, 481-.
- open, of reduced height. *Kamerlingh Onnes*, H. [1898] Amst. Ak. Vs. 7 (1899) 176-; Amst. Ak. P. 1 (1899) 213-.
- telegraphic. *Armellini*, T. Rm. N. Linc. At. 28 (1875) 229-.
- uniformly sensitive. *Moutier*, J. Par. S. Phlm. Bll. 1 (1877) 171-.
- for highest vacua. *Sutherland*, W. Ph. Mg. 43 (1897) 83-.
- vapour-tension. *Perrier*, L. C. R. 91 (1880) 538-.
- water. *Forbes*, J. D. *Edinb. N. Ph. J.* 19 (1835) 36-.
- , and anemometer. *Silliman*, J. M. [1888] Am. I. Mn. E. T. 17 (1889) 66-.
- Wollaston's. *Napier*, J. R. *Glasg. T. I. Eng.* 12 (1869) 119-.

Manometry, influence of weight on. *Kapustin*, T. Rs. Ps.-C. S. J. 26 (Ps.) (1894) 307-; J. de Ps. 4 (1895) 585-.

Manostat. *Smits*, A. [1897] Amst. Ak. Vs. 6 (1898) 321-; Z. Ps. C. 33 (1900) 39-.

- Measurement of air enclosed in barometer. *Schreiber, P.* Exner Rpm. 22 (1886) 162-.
- — — in mines. *Dickinson, J.* [1875] Manch. Gl. S. T. 14 (1878) 31-.
- — draught and analysis of gas, apparatus. *Kasalovský, J.* Oestr. Z. Brgw. 26 (1878) 407-.
- — — in chimneys. *Schwartz, L.* Erdm. J. Tech. C. 2 (1828) 345-.
- — very high vacua. *Rood, O. N.* Am. J. Sc. 22 (1881) 90-.
- — velocity by gauging tube. *Bazin, H.* A. Pon. Chauss. 14 (1887) 195-.
- — *vis viva* of fluid in pipe. *Masoni, U.* Nap. I. Inc. At. 11 (1898) No. 2, 4 pp.
- Motion of steam in tubes. *Auscher, —.* A. Mines 7 (1895) 325-.
- Pascal's principle, experimental demonstration. *Pisati, G.* N. Cim. 27 (\*1868) 351-.
- Piezometers used in hydraulic investigations, experiments. *Mills, H. F.* [1878] Am. Ac. P. 14 (1879) 26-.
- Pitot's tube. *Rateau, —.* A. Mines 13 (1898) 331-.
- — —, modifications. *Darcy, H.* Dijon Mm. Ac. 6 (1857) (pte. 2) 159-.
- Pneumatic analogue of potentiometer. *Shaw, W. N.* B. A. Rp. (1898) 778-.
- — — Wheatstone's bridge. *Shaw, W. N.* R. S. P. 47 (1890) 462-.
- — brakes. *Huberti, A.* Rv. Un. Mines 1 (1888) 1-.
- — —, quick working. *Kapteyn, A. P.* 's Gravenh. I. Ing. Ts. (1888-89) (Vh.) 103-, 122-.
- Powder gases, movement in bore of gun. *Piobert, —.* C. R. 49 (1859) 757-, 829-, 909-, 953-.

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- Bevan, B.* Ph. Mg. 6 (1829) 284-.
- Moutier, J.* Par. S. Phlm. Bl. 11 (1874) 48-.
- Mensbrughe, G. van der.* Brux. S. Sc. A. 18 (1894) (Pt. 1) 16-.
- of air, application in water installations. *Herhold, —.* Hann. Archt.-Vr. Z. 31 (1885) 509-.
- — —, balance. *Perrigault, —.* Les Mondes 38 (1875) 355-.
- in air-pipes. *Pagliani, S., & Morisani, E.* Nap. I. Inc. At. 5 (1892) No. 3, 24 pp.
- changes, measurement apparatus. *Wolff, L. C.* Z. Instk. 4 (1884) 50-.
- — —, by mirror method. *Röntgen, W. C. A.* Ps. C. 51 (1894) 414.
- and density, relations, deduced from principle of energy. *Herran, A.* As. Fr. C. R. (1898) (Pt. 1) 133-.
- difference between hydrostatic and hydraulic. *Wallentin, I. G.* A. Ps. C. 4 (1878) 294-.
- von Drieberg's views. *Kersting, R.* [1845] (viii) Riga Cor.-Bl. 1 (1846) 81-.
- effective, in hydraulic presses, arrangement of levers for measurement. *Köpping, H.* Carl Rpm. 17 (1881) 662-.
- exerted by flow of liquid. *Bernardi, E.* Ven. I. At. (1887-88) 1309-.

- of explosives. *Vieille, P.* As. Fr. C. R. (1890) (Pt. 1) 53-.
- fluid jet on wedge. *Kotel'nikov, A. P.* Kazan S. Nt. (Ps.-Mth.) P. 8 (1890) 4-;
- Fschr. Ps.* (1889) (Ab. 1) 358-.
- fluids in motion. *Bonmycastle, C.* [1840] Am. Ph. S. T. 7 (1841) 113-.
- — —, instrument for measuring. *Caligny, A. de.* Par. S. Phlm. PV. (1840) 106-.
- gas, measurement under different conditions. *Prytz, K.* Ts. Ps. C. 30 (1891) 289-.
- — —, regulation. *Obach, E.* Tel. E. J. 14 (1885) 339-.
- — —, regulator. *Murphy, P.* Mer. S. J. (1898) 480-.
- — —, regulators. *Peebles, D. B.* [1876] Sc. S. Arts T. 9 (1878) 351-.
- — —, theories, critical account. *Gosiewski, W.* Par. T. Nauk Śc. Pam. 5 (\*1874) Art. 2, 15 pp.
- gaseous, small. *Brush, C. F.* Ph. Mg. 44 (1897) 415-.
- high. *Cailletet, L.* A. C. 19 (1880) 386-.
- — —. *Marié, G.* A. Mines 19 (1881) 104-.
- — —. *Barus, C.* Am. Ac. P. 25 (1890) 93-.
- — —. *Jacobus, D. S.* Am. As. P. (1893) 123-.
- — —. *Lisell, E.* Stockh. Öfv. (1898) 697-.
- — —. *Palmer, A. de F.* Am. J. Sc. 6 (1898) 451-.
- — —, apparatus for production. *Stratton, S. W.* Ph. Mg. 38 (1894) 160.
- indicator for pneumatic brake. *Kapteyn, A. P.* [1886] 's Gravenh. I. Ing. Ts. (1886-87) (Vh.) 102-.
- — — Westinghouse brake. *Kapteyn, A.* Rv. Un. Mines 19 (1886) 86-.
- internal. *Steinhauser, A.* Carl Rpm. 13 (1877) 285-.
- — —, in moving liquid. *Boussinesq, J.* Liouv. J. Mth. 9 (1883) 425-.
- kinetic, in homogeneous and incompressible fluid. *Gosiewski, W.* Krk. Ak. (Mt.-Prz.) Pam. 17 (1890) 128-; Cre. Ac. So. Bl. (1889) No. 9, xix-.
- lateral, apparatus for demonstrating. *Carl, P.* Carl Rpm. 11 (1875) 68-.
- laws, apparatus for demonstrating. *Strehl, K.* Cztg. Opt. 18 (1897) 181-.
- in light fluids. *Julius, V. A.* Mbl. Nt. (1887) 1-.
- — —. *Plaats, J. D. van der.* Mbl. Nt. (1888) 23-.
- methods of measuring. *Rojas, F. de P.* (xii) Barcel. Ac. Mm. 1 (1878) 237-.
- — —. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 2 (1893) (Sem. 2) 8-.
- on part of surface of fluid. *Schiller, N.* Mose. S. Sc. Bl. 91 (No. 1) (1894) 31-.
- plate and wedge by Kirchhoff's method. *Réthy, M.* (xii) Orv.-Term. Ets. 4 (1879) (Term. Szak) 105-.
- potential. *Lyapunov, A. M.* (xii) Rs. Ps.-C. S. J. 13 (Ps.) (1881) [(Pt. 1)] 351-.
- problem. *Malfatti, G. F.* Mod. S. It. Mm. 12 (1805) 100-.



- produced by change of velocity in water pipes. *Frizell, J. P.* Am. S. CE. T. 39 (1898) 1-.
- explosive gaseous mixtures. *Petavel, J. E.* B. A. Rp. (1900) 655-.
- powder gases, accelerograph of Deprez for measuring. *Sebert, H.* Par. S. Ps. Sé. (1879) 107-.
- regulation in gasometers. *Nöggerath, E. J.* Civing. 2 (1856) 67-.
- in running water. *Schönemann, T.* Berl. Mb. (1861) 1136-.
- small. *Fitzgerald, G. F., & Joly, J.* [1888] *Dubl. S. Sc. P.* 6 (1888-90) 128-.
- sounding apparatus for ships. *Anon.* Rv. So.-Ind. [24 (1892)] 220-.
- statical and dynamical, of water. *Bainbridge, E.* N. Eng. I. Mn. E. T. 21 (1872) 49-.
- of stream of air on flat plate. *Willis, (Prof.) R.* [1828] *Camb. Ph. S. T.* 3 (1830) 129-.
- , infinite, on wedge-shaped wall. *Bobuilev, D. K.* (xii) *Rs. Ps.-C. S. J.* 13 (Ps.) (1881) [Pt. 1] 63-; (ix) A. Ps. C. (Beibl.) 6 (1882) 163-.
- at right angles to direction of current. *Ludwig, C., & Stefan, J.* Wien SB. 32 (1858) 25-.
- streams. *Cattaneo, G.* [1822] *Padova N. Sag.* 2 (1825) 224-.
- on surface of immersed body. *Razzaboni, C.* [1862] (xi) *Mod. Ac. Sc. Mm.* 5 (1863) 3-.
- , plane or curved. *Martynowski, A.* Par. T. Nauk Sc. Pam. 3 (\*1873) 215-; 4 (\*1874) Art. 1, 78 pp.
- , —, theory. *Steen, A.* [1872] *Kjöb. Skr.* 9 (1873) 539-; *Résumé*, 558-.
- and temperature measurements, capillary corrections. *Pernet, J. Z.* Instk. 6 (1886) 377-.
- theory. *Cournot, A. A.* (vi *Adds.*) *Férussac Bll. Sc. Mth.* 9 (1828) 10-.
- , *Moon, R.* Ph. Mg. 36 (1868) 27-, 116-.
- true theory as applied to elastic fluids. *Moon, R.* (viii) *Ph. Mg.* 26 (1863) 70-.
- variation in fluid in motion. *Lagerhjelm, P.* Sk. Nf. F. 3 (1842) 319-.
- on wall (passage in Fischer's Physics). *Volpicelli, P.* G. Arcad. 49 (1831) 103-.
- (—) — (—) (Volpicelli). *Oddi, G.* G. Arcad. 50 (1831) 62-.
- of water at different depths. *Borel, F.* Neuch. Bll. 7 (pt. 2) (1866) 155-.
- against foundations. *Brennecke, L. Z.* Bauw. 36 (1886) 101-, iv.
- on walls of pipes. *Turazza, D.* Cuyper Rv. Un. 29 (1871) 405-.

- Reaction of liquid jet. *Webb, J. B.* Franklin I. J. 124 (1887) 144-, 463-; 125 (1888) 31-.
- produced by efflux of fluids in vessels containing them. *Brunacci, V.* Brugnatelli G. 7 (1814) 89-; *Mil. Mm. I. Lomb. Ven.* 3 (1816-17) 257-.
- Resistance to air currents in mines. *Elwen, T. L.* [1889] *N. Eng. I. Mn. E. T.* 38 (1891) 205-.
- — — — — *Murgue, D.* [1893-94] *Fed. I. Mn. E. T.* 6 (1894) 135-, 418-; 7 (1894) 211-.

- Resistance formula for river flow. *Seddon, J. A.* St. Louis Ac. T. 5 (1892) lvi.
- Rheometer, application to Drummond's light and to the analysis of gas-burners. *Lemoine, É.* As. Fr. C. R. 2 (1873) 153-.
- Rhysimeter. *Fletcher, A. E.* B. A. Rp. 41 (1871) (Sect.) 234-.
- Safety valve, Dulac's, experiments. *Walckenaer, C.* A. Mines 16 (1889) 124-.
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- Suction by blowing. *Schinz, E.* Bern Mt. (1859) 104-.
- phenomenon. *Caligny, A. de.* Par. S. Phlm. PV. (1843) 30-.
- Sympiezometers, Adie's, and Cummins', observations with. *Swart, J.* Tindal Vh. Zee-wezen 3 (1843) 613-.
- Theory of efflux of elastic fluids. *Hugoniot, —.* Par. S. Ps. Sé. (1887) 7-.
- Vacuum produced by air current. *Girouard, (Dr.) —.* Les Mondes 6 (1864) 513-.

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- of air. *Serrell, E.* Aër. S. Rp. 17 (1882) 5-.
- currents, underground. *Fuchs, P. Z.* Berg.-H. Salw. 47 (1899) (Ab.) 227-; 48 (1900) (Ab.) 12-.
- , distribution over section of tube. *Recknagel, G.* D. Nf. Vh. (1899) (Th. 2, Hälfte 1) 76-.
- in pipes. *Donkin, B. I.* CE. P. 111 (1893) 345-.
- rushing into vacuum. *Wilde, H.* Manch. Lt. Ph. S. Mm. 10 (1887) 146-.
- in spout. *Hanappe, S.* Rv. Un. Mines 40 (1897) 114-.
- currents, adaptation of Robinson's anemometer to measurement. *Razzaboni, C.* Bologna Ac. Sc. Mm. 8 (1887) 597-.
- of air or water carrying mineral grains in suspension. *Thoulet, J.* C. R. 97 (1883) 1513-; A. Mines 5 (1884) 507-.
- , Amsler's hydrometric apparatus. *Zdzinski, A.* Am. Eng. & Railroad J. 67 (1893) 239-.
- , and direction, instrument for measuring, Leupold's electric. *Weber, L.* Elekttech. Z. 7 (1886) 303-.
- , —, instruments for recording. *Jones, J. R.* S. P. 24 (1876) 321-.
- , —, observations at single point. *Estignard, X.* Rv. Mar. 38 (1873) 224-.
- , —, registering apparatus for. *Weber, L.* [1896] *Sohl.-Holst. Nt. Vr. Schr.* 11 (1898) 61.
- , experiments. *Fossombroni, V.* Siena At. Ac. 9 (1808) 261-.
- , hydrometric pendulum for measuring. *Bonati, T.* Mod. Mm. S. It. 8 (1799) 435-.
- , —, —, —, *Venturoli, G.* [1809-14] *Mod. S. It. Mm.* 14 (1809) 158-; *Bologna Opusc. Sc. I* (1817) 81-.
- , —, —, —, *Gerstner, F. J. von.* [1819] *Böhm. Gs. Ab.* 6 (1820) 92 pp.



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- of currents, instrument for measuring. *Regnier, E.* Nicholson J. 29 (1811) 68-.
- , —, —, —, [Barilli, G.] *Filopanti, Q. B.* N. A. Sc. Nt. 5 (1841) 165-.
- , —, —, —, *Stearns, F. P.* Am. S. CE. T. 12 (1883) 301-.
- , —, —, —, *asta ritrometrica. Bonati, T.* Verona Mm. S. It. 2 (1784) 676-; Mod. Mm. S. It. 8 (1799) 435-; Mil. Mm. I. Lomb. Ven. 3 (1816-17) 85-.
- , —, —, —, *Venturoli, G.* Bologna Opusc. Sc. 1 (1817) 141-.
- , —, —, —, *Poletti, G.* Bologna Opusc. Sc. 2 (1818) 394-.
- , —, —, —, electric. *Fuchs, K.* Elekttech. Z. 8 (1887) 74-, 150.
- , —, —, —, *Weber, L.* Elekttech. Z. 8 (1887) 149-.
- , —, —, —, *néw. Razzaboni, C.* Bologna Ac. Sc. Mm. 10 (1879) 185-.
- , —, —, —, recording. *Razzaboni, C.* Rm. At. R. Ac. 26 (1873) 512-.
- , —, —, —, testing. *Gordon, R.* I. ME. P. (1884) 190-.
- , —, —, —, *Woltmann's. Eytelwein, J. A.* Berl. Ab. (1816-17) 23-.
- , —, —, —, *Baumgarten, —.* Par. A. Pon. Chauss. 14 (1847) 326-.
- , —, —, —, *L'Éveillé, —.* Par. A. Pon. Chauss. 19 (1860) 215-.
- , —, —, —, *Treviranus, L. G. Förster* Al. Bauztg. 26 (1861) 125-.
- , —, —, —, *Culmann, K.* Zür. Vjschr. 13 (1868) 392-.
- , —, —, —, *Kvassay, E. von.* [1876] A. Pon. Chauss. 13 (1877) 236-.
- , —, —, —, *Rateau, —.* A. Mines 13 (1898) 331-.
- , —, —, —, formula of velocity. *Sasse, —.* Z. Bauw. 24 (1874) 77-; 26 (1876) 433-.
- , —, vertical parabola in measurements. *Sasse, —.* (xi) Hann. Archt.-Vr. Z. 19 (1873) 191-.
- measurement at sea. *Schück, A.* Z. Instk. 5 (1885) 385-.
- of ocean currents. *Fasci, A.* Rv. Mar. 27 (1869) 761-; 28 (1870) 162-.
- at great depths. *Suchier, E.* Hann. Archt.-Vr. Z. 31 (1885) 373-.
- and pressure in current. *Michelotti, I.* [1805] Turin Mm. Ac. (1805-08) 181-.
- of rivers, and Harlacher's hydrometric apparatus and methods. *Ringel, A.* Civing. 31 (1885) 357-.
- , instrument for measuring, electric. *Harlacher, A. R.* [1883] Tel. E. J. 13 (\*1884) 148-.
- , new method of measuring. *Poletti, G.* Mod. Mm. S. It. 19 (1821) (Mt.) 330-.
- streams. *Focacci, F.* Mod. S. It. Mm. 13 (1807) 390-.
- , *Delprat, J. P.* Amst. N. Vh. 10 (1844) 157-; Amst. Vh. 3 (1850) 55-.
- at various depths, apparatus for measuring. *Ritter, C.* As. Fr. C. R. (1889) (Pt. 2) 379-.

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- of streams at various depths, investigated by Brünings' measurements. *Hagen, G. H. L.* Berl. Ak. Ab. (1883) (Mth., Ab. 1) 79 pp.
- , —, instrument for measuring. *Müller, W.* Dingler 304 (1897) 8-.
- subaqueous, graphic representation (Humphreys and Abbot). *Fambri, P., & Revy, J. J.* Rm. R. Ac. Linc. T. 2 (1878) 149-.
- Water measurer, theory. *Savinère, É.* Gén. Civ. 9 (1886) 214-.

## 2540 Measurement of viscosity.

(See also Physics 0325.)

- Lundquist, C. G.* Ups. Årsk. (1875) (Mth.) (No. 3) 26 pp.
- Wijkander, E. A.* [1878] A. Ps. C. Beibl. 3 (1879) 8-.
- Margules, M.* Wien Ak. Sb. 83 (1881) (Ab. 2) 588-.
- Slotte, K. F.* Helsingf. Öfv. 32 (1890) 116-.
- Mützel, K. A.* Ps. C. 43 (1891) 15-; 44 (1891) 787.
- Brodmann, C.* A. Ps. C. 45 (1892) 159-.
- McGill, A.* [1894] Cn. Re. Sc. 6 (1896) 153-.
- Stotte, K. F.* Helsingf. Öfv. 37 (1895) 11-.
- Absolute measure for. *Obermayer, A. von.* Carl Rpm. 15 (1879) 682-.
- Air. Schneebeli, H.* Arch. Sc. Ps. Nt. 14 (1885) 197-.
- *Tomlinson, H.* [1886] Phil. Trans. 177 (1887) 767-, 795-.
- *Stokes, G. G.* [1886] Phil. Trans. 177 (1887) 786-.
- *Fabry, C., & Perot, A.* C. R. 124 (1897) 281-; A. C. 13 (1898) 275-.
- , experiments on viscosity. *Murray, J. E.* [1890] Glasg. Ph. S. P. 22 (1891) 199-.
- and other gases. *Maxwell, J. C.* Phil. Trans. 156 (1866) 249-.
- , measurement of viscosity by torsional vibrations. *Braun, W., & Kurz, A.* Carl Rpm. 18 (1882) 569-; 19 (1883) 343-.
- , —, —, —, *Kurz, A.* Exner Rpm. 19 (1883) 605-.
- , passage through porous bodies with very small pressure differences. *Christiani, A.* Arch. An. Pl. (Pl. Ab.) (1882) 112-.
- Anhydrous solutions. *Smoluchowski, M. von.* Wien Ak. Sb. 102 (1893) (Ab. 2a) 1136-.
- Apparatus for demonstrating friction in very rarefied gas. *Kundt, A.* A. Ps. C. 158 (1876) 568-, 660.
- , oils. *W., V.* Rv. Sc.-Ind. 18 (1886) 210-.
- , —, *Žukovskij, N. E.* Mosc. S. Sc. Bil. 73 (No. 1) (1891) 25-; Fsch. Ps. (1891) (Ab. 1) 262.
- Application of air-friction in measuring instruments. *Töppler, A.* A. Ps. C. 149 (1873) 416-.
- aperiodic damping. *Riecke, E.* A. Ps. C. 51 (1894) 156-.

- Correction for ends of tubes. *Couette, M. J.* de Ps. 9 (1890) 560-.
- Damping of oscillations by air. *Sang, E.* Edinb. R. S. P. 16 (1890) 181-.
- of solids in fluids. *Klemenčič, I.* [1881] Wien Ak. Sb. 84 (1882) (Ab. 2) 146-.
- Deviations from Poiseuille's law. *Wetzstein, G. A.* Ps. C. 68 (1899) 441-.
- "Drag" of water upon water at low velocities. *Haughton, S. B. A.* Rp. (1879) 275-.
- — — — —, and of air upon air. *Haughton, S., & Reynolds, J. E.* [1880] Ir. Ac. P. 3 (1883) 277-.
- Efflux of air at different pressures through different orifices and tubes of different sizes and lengths. *Magrini, L.* Mil. At. I. Lomb. 1 (1858) 333-.
- method. *Hagenbach, E.* Basel Vh. 2 (1860) 532-.
- — — — — *Knibbs, G. H.* N. S. W. R. S. J. 29 (1895) 77-; 30 (1897) 186-.
- Fluidity of liquids. *Heen, P. de.* Brux. Ac. Bil. 45 (1878) 798-.
- measurer. *Heyer, —.* [1893] St. Gal. B. (1893-94) 93-.
- of water at various temperatures. *Gerstner, F. J. von.* Gilbert A. 5 (1800) 160-.
- Fluids in corresponding states. *Haas, M. de.* Amst. Ak. Vs. [2] (1894) 126-; 3 (1895) 62-.
- Friction between oil and air. *Markovits, S.* Wien Ak. Sb. 100 (1891) (Ab. 2a) 785-.
- Gases. *Meyer, O. E. A.* Ps. C. 125 (1865) 177-, 401-, 564-; 127 (1866) 253-, 353-; 148 (1873) 1-, 203-.
- *Meyer, O. E., & Springmühl, F.* [1872] A. Ps. C. 148 (1873) 526-.
- *Boltzmann, L.* Wien Ak. Sb. 81 (1880) (Ab. 2) 117-; 84 (1882) (Ab. 2) 40-, 1230-.
- at high temperatures. *Barus, C. Am. J. Sc.* 35 (1888) 407-; A. Ps. C. 36 (1889) 358-.
- Glycerin solutions. *Schall, C., & Rijn, W. van.* Z. Ps. C. 23 (1897) 329-.
- Influence of magnetisation and electrification. *König, W.* A. Ps. C. 25 (1885) 618-.
- Liquids. *Marangoni, C.* (xii) Rv. Sc.-Ind. 11 (1879) 144-, 188-.
- *Pagliani, S., & Battelli, A.* Tor. Ac. Sc. At. 20 (1885) 607-, 845-.
- *Pagliani, S., & Oddone, E.* Tor. Ac. Sc. At. 22 (1886-87) 314-.
- *Graetz, L. A.* Ps. C. 34 (1888) 25-.
- *Vautier, T. A. C.* 15 (1888) 289-.
- *Perry, J. L.* Ps. S. P. 12 (1894) 236-; Ph. Mg. 35 (1893) 441-.
- *Jones, O. G. L.* Ps. S. P. 13 (1895) 49-; Ph. Mg. 37 (1894) 451-.
- *Petroff, N.* St. Pét. Ac. Sc. Bil. 5 (1896) 365-.
- apparatus for study, new. *Couette, M. C.* R. 107 (1888) 388-.
- application of graphic methods to study. *Vautier, T. A. C.* 15 (1888) 433-.
- bibliography, 1800-1889. *Gee, W. W. H. Manch. Lt. Ph. S. Mm. & P.* 3 (1890) 123-.
- Liquids, definition. *Hagenbach-Bischoff, E.* Arch. Sc. Ps. Nt. 34 (1895) 377-.
- in electric field. *Pacher, G., & Finazzi, L.* Ven. I. At. (1899-1900) (Pt. 2) 389-.
- measurement by torsional vibrations. *König, W. A.* Ps. C. 32 (1887) 193-.
- Measurement by oscillating discs. *Grossmann, L.* [1880] A. Ps. C. 16 (1882) 619-.
- oscillations. *Meyer, O. E. A.* Ps. C. 32 (1887) 642-; 33 (1888) 712; Bresl. Schl. Gs. Jbr. (1887) 173-.
- Mercury. *Umani, A.* N. Cim. 3 (1896) 151-.
- vapour. *Noyes, A. A., & Goodwin, H. M.* Am. Ac. P. 32 (1897) 225-.
- Method. *Meyer, O. E. A.* Ps. C. 43 (1891) 1-; 44 (1891) 787.
- Maxwell's. *Schmidt, T. S. A.* Ps. C. 16 (1882) 633-.
- — — — —, for air. *Meyer, O. E. A.* Ps. C. 143 (1871) 14-.
- Stokes's. *Meyer, O. E.* Münch. Ak. Sb. 17 (1888) 343-.
- Methyl chloride between boiling point and critical point. *Haas, M. de.* Amst. Ak. Vs. [2] (1894) 123-.
- Mixtures of liquids and of solutions. *Lees, C. H.* [1900] L. Ps. S. P. 17 (1901) 460-.
- saline solutions, relation to state of ionisation. *Barnes, J.* [1899] N. Scotia I. Sc. P. & T. 10 (1903) 113-.
- Pendulums, effect of rotation of ball on logarithmic decrement. *Stokes, G. G.* Phil. Trans. 177 (1887) 789-.
- Rate of flow from capillary tube. *Wilberforce, L. R.* Ph. Mg. 31 (1891) 407-.
- — — — —, influence of electricity. *Langer, C.* Exner Rpm. 25 (1889) 461-.
- Saline solutions. *Moore, B. E.* Ps. Rv. 3 (1896) 321-.
- — — — — and their mixtures. *Kanitz, A.* Z. Ps. C. 22 (1897) 336-.
- Solutions of chromates. *Slotte, K. F. A.* Ps. C. 14 (1881) 13-.
- Steam at high temperatures. *Cantone, M.* Rm. R. Ac. Linc. Mm. 19 (1884) 253-.
- Superficial viscosity of films of solution of saponine. *Mensbrughe, G. van der.* Brux. Ac. Bil. 29 (1870) 368-.
- — — — — liquids. *Marangoni, C.* N. Cim. 5 & 6 (1871) 239-.
- — — — — *Luvini, G.* (xii) Rv. Sc.-Ind. 4 (1872) 262-.
- — — — — *Plateau, J. A. F.* Brux. Ac. Bil. 34 (1872) 404-; 48 (1879) 106-.
- Torsion viscosimeter. *Doolittle, O. S.* Am. Eng. & Railroad J. 67 (1893) 583-.

## VARIATION OF VISCOSITY.

- with chemical composition. *Handl, A., & Pribram, R.* [1878-81] Wien Ak. Sb. 78 (1879) (Ab. 2) 113-; 80 (1880) (Ab. 2) 17-; 84 (1882) (Ab. 2) 717-.
- — — — — of liquids. *Thorpe, T. E., & Rodger, J. W.* Phil. Trans. (A) 189 (1897) 71-.
- — — — — *Thorpe, T. E.* [1898] R. I. P. 15 (1899) 641-.

## 2540 Variation of Viscosity

- with density. *Warburg, E., & Babo, C. H. L.* von. A. Ps. C. 17 (1882) 390-.
- , of liquids. *Warburg, E., & Sachs, J.* A. Ps. C. 22 (1884) 518-.
- moisture, of hydrogen. *Rayleigh, (Lord).* R. S. P. 62 (1898) 112-.
- pressure. *Röntgen, W. C. A.* Ps. C. 22 (1884) 510-.
- , *Cohen, R. A.* Ps. C. 45 (1892) 666-.
- temperature, of air. *Holman, S. W.* [1876-86] Am. Ac. P. 12 (1877) 41-; 21 (1886) 1-.
- , — argon. *Rayleigh, (Lord).* R. S. P. 66 (1900) 68-.
- , — bromine. *Kann, L.* Wien Ak. Sb. 106 (1897) (Ab. 2a) 431-.
- and chemical composition. *Graetz, —.* D. Nf. Tbl. (1887) 83.
- , empirical formulæ. *Duff, A. W.* Ps. Rv. 4 (1897) 404-.
- , of gases. *Wiedemann, E. E. G.* Arch. Sc. Ps. Nt. 56 (1876) 277-.
- , —, *Breitenbach, P.* A. Ps. C. 67 (1899) 803-.
- , —, *Rayleigh, (Lord).* [1900] R. S. P. 67 (1901) 137-.
- , — and vapours. *Schumann, O. A.* Ps. C. 23 (1884) 353-.
- , — liquids. *Heen, P. de.* Brux. Ac. Bll. 7 (1884) 248-; 11 (1886) 29-.
- , — mercury. *Koch, S. A.* Ps. C. 14 (1881) 1-.
- , —, *Bažinskij, A. I.* Mose, S. Nt. Bll. 14 (1900) (Prot.) 56-; Fsch. Ps. (1900) (Ab. 1) 213.
- , —, — vapour. *Koch, S. A.* Ps. C. 19 (1883) 857-.
- , —, oils. *Garvanoff, J. G.* Wien Ak. Sb. 103 (1894) (Ab. 2a) 873-.
- , —, Rosencranz's observations. *Meyer, O. E. A.* Ps. C. 2 (1877) 387-.
- , of water. *Slotte, K. F. A.* Ps. C. 20 (1883) 257-.
- vapour pressure. *Heen, P. de.* Brux. Ac. Bll. 10 (1885) 251-.
- velocity. *Élie, B.* J. de Ps. 1 (1882) 224-.

Very viscous liquids. *Schöttner, F.* Wien Ak. Sb. 79 (1879) (Ab. 2) 477-.

—, —, *Brodman, C. A.* Ps. C. 48 (1893) 188-.

Viscometer. *Babcock, S. M.* [1886] J. Anal. C. 1 (1887) 151-.

Viscosity, density and refractivity of argon and helium. *Rayleigh, (Lord).* R. S. P. 59 (1896) 198-.

— and elastic after effect in liquids. *Roiti, A.* N. Cim. 3 (1878) 5-.

— electrical conductivity of mercury and amalgams. *Schweidler, E. (Ritter) von.* Wien Ak. Sb. 104 (1895) (Ab. 2a) 273-.

— of elements in liquid state. *Pacher, G.* Ven. I. At. (1897-98) 516-.

— in liquids, and instruments for measurement. *McGill, A.* Cn. R. S. P. & T. 1 (1895) (Sect. 3) 97-.

— on passing from fluid to solid, change of order. *Barus, C.* Ph. Mg. 29 (1890) 337-.

## Artesian Wells 2790

Viscosity and resistance. *Rennie, G.* Phil. Trans. (1831) 423-.

—, —, electrolytic, of gelatin solution. *Griffiths, A.* Manch. Lt. Ph. S. Mm. & P. 41 (1897) ix-.

— of supercooled fluids. *Tammann, G. Z.* Ps. C. 28 (1899) 17-.

Water. *Geoffroy, L.* C. R. 88 (1879) 573-.

—, *Mallock, A.* R. S. P. 45 (1889) 126-.

—, *Barnett, R. E.* R. S. P. 56 (1894) 259-.

—, *Pacher, G.* Ven. I. At. (1898-99) (Pt. 2) 785-.

## HYDRAULICS AND FLUID RESISTANCE.

### 2790 General.

*Pictet, M. A.* Bb. Un. 15 (1820) 315-; 16 (1821) 153-, 244-; 17 (1821) 158-; 19 (1822) 220-, 299-; 20 (1822) 68-.

### ARTESIAN WELLS.

*Arago, D. F. J.* Par. Bur. Long. An. (1835) 181-.

*Héricart-Ferrand (vicomte de Thury), L. É. F.* [1835] (xii) Fr. S. Ag. Mm. (1834) 361-.

*Viollet, J. B.* Par. S. Gl. Bll. 6 (1834-35) 144-; Par. Bll. S. Encour. 36 (1837) 121-; 37 (1838) 83-.

*Milne, D.* Edinb. N. Ph. J. 35 (1843) 79-.

*Buckland, W.* Edinb. N. Ph. J. 37 (1844) 318-.

*Carteron, —.* (vi Add.) Aube Mm. S. Ag. 16 (1851-52) 277-.

crushing of interior tube. *Caligny, A. de.* C. R. 13 (1841) 1156-.

discharge. *Dru, —.* Par. Ing. Civ. Mm. (1862) 57-.

gauging. *Degoussé, J.* (vii) Rv. Sc. 6 (1841) 341-.

—, *Sagey, —.* A. Mines 3 (1843) 347-.

and Modenese wells. *Campilanzi, E.* Ven. Esercit. Aten. 3 (1839) 105-.

pipes. *Bertot, H.* A. Gén. Civ. 1 (1862) (pte. 2) 13-.

yield at different depths. *Michal, A.* C. R. 56 (1863) 78-; A. Pon. Chauss. 11 (1866) 211-.

Channels, streams and pipes; evaluation of intermolecular work. *Boileau, P.* Cherb. S. Sc. Nt. Mm. 21 (1877) 5-.

—, —, —, properties common to. *Boileau, P.* C. R. 82 (1876) 1479-; 84 (1877) 326-; 85 (1877) 429-.

Cohesion of liquids, application in mechanics. *Davaigne, —.* Fr. Cg. Sc. 20 (1853) 355-.

Draining by sinking a pit. *Stetten-ob-Lonthal. Bruckmann, A. E.* Würtb. Jh. 9 (1853) 173-.

— wells, artesian. *Emmery, H. C.* Par. A. Pon. Chauss. 10 (1835) 362-.



## 2800 Hydraulic Resistance

- Efficiency of sails, windmills, screws, etc., in air or water. *Kelvin, (Lord)*. Nt. 50 (1894) 425-.
- Hydraulic moment of canal section. *Aird, C. K.* Hann. Archt.-Vr. Z. 46 (1900) 401-.
- Hydraulics. *Saint-Guilhem, P. D.* Toul. Mm. Ac. 4 (1834-36) 229-.
- , *Györy, S.* Évk. 5 (1842) (Pt. 2) 214-.
- , *Rossi, V. A.* Nap. Ms. 7 (1845) 348-.
- in 1833. *Rennie, G. B. A.* Rp. (1833) 153-; (1834) 415-.
- , applied. *Vigreux, L. A.* Gén. Civ. 5 (1876) 505-.
- , Italian works. *Anon.* (vi 156) Bb. It. 59 (1830) 367-.
- , principles. *Lombardi, A.* [1811] Mod. S. It. Mm. 16 (1813) 1-.
- , —, new. *D'Auria, L.* Franklin I. J. 75 (1879) 73-.
- , progress. *Brioschi, F.* Il Polit. 1 (1866) (Tech.) 101-; 419-.
- , researches. *Peacock, R. A.* Weale Q. Pp. 5 (1846) 63 pp.
- , —. *Sommerfeld, A. D.* Nf. Vh. (1900) (Th. 2, Hälfte 1) 56.
- Hydrotechnic notes. *Fischer, —.* Münch. Z. Archt. 2 (1870) 80.
- Maritime engineering practice. *Stevenson, T.* [1885] Edinb. R. S. P. 13 (1886) 80-.
- Resistance of air to planes in motion. *Hagen, G. H. L.* Berl. Ak. Ab. (1874) (Mth.) 31 pp.
- Standard levee sections (water pressure). *Coppée, H. St. L.* Am. S. CE. T. 39 (1898) 191-.

## 2800 Delivery of fluids in pipes.

(See also 2460.)

- Collignon, É. A.* Pon. Chauss. 4 (1892) 845-.
- Fedorow, E.* Fsch. Ps. (1893) (Ab. 1) 354-.

### AIR.

- Combes, C. C. R.* 4 (1837) 945-; A. Mines 12 (1837) 373-.
- Chovene, W. D. R. S. P.* 7 (1854-55) 467-; 8 (1856-57) 177-; 10 (1859-60) 461-.
- Joule, J. P.* [1860] Manch. Ph. S. Mm. 1 (1862) 102-.
- compressed. *Koch, F. K. L.* Gött. Stud. Vr. 1 (1824) 1-.
- , *Schmidt, G. G.* Pogg. A. 2 (1824) 39-.
- , *Koch, F. K. L.* [1828] Gött. Stud. Vr. 3 (1833) 1-.
- , *Cagnoni, A.* Mil. At. I. Lomb. 1 (1858) 299-.
- , *Weisbach, J.* Civing. 12 (1866) 1-; 77-.
- , *Schmidt, G.* Dingler 238 (1880) 441-; 240 (1881) 329-.
- discharge through uniform pipes or channels. *Wilkinson, T. T.* (viii) Manch. Gl. S. T. 3 (1862) 289-.
- experiments of Pecqueur. *Poncelet, J. V.* C. R. 21 (1845) 178-.

## Delivery in Pipes 2800

- formulæ. *Aubuisson de Voisins, J. F. d'.* Toul. Mm. Ac. 2 (1830) 149-.
- , theoretical. *Morin, A. C. R.* 54 (1862) 406-.
- motion in sewers. *Rözahegyi, A. von.* Z. Bl. 17 (1881) 23-.
- velocity. *Banks, —.* [1800] Manch. S. Mm. 5 (1802) 398-.
- Apparatus for preventing accumulation of air in pipes. *Steevens, J.* Tilloch Ph. Mg. 39 (1812) 173-.
- study of flow of fluids in pipes. *Élie, B.* J. de Ps. 1 (1882) 459-.
- Application of theory of motion of fluids to Marozeau's experiments. *Morin, A. C. R.* 22 (1846) 1102-.
- Bernoulli's hydraulic theorem, extension. *Buquoy, G. von.* Oken Isis (1823) 688-.
- Carnot's theorem, true sense and sense in hydraulics. *Ramsing, H. M.* Mth. Ts. 4 (1862) 49-.
- Circulation of blood. *Hoorweg, J. L.* Amst. Ak. Vh. 27 (1890) 72 pp.; Fsch. Mth. (1890) 972-.
- — — application of mathematical analysis. *Kramp, C.* Gergonne A. Mth. 3 (1812-13) 77-; 7 (1816-17) 270-.
- water in hot water pipes, theory. *Ricco, A.* Palermo G. Sc. Nt. 17 (1886) 9-.
- Cock, substitute for vent-pg. *Hare, R.* Am. Ph. S. T. 6 (1809) 105-.
- Dimensions of orifices, practical calculation (reference to valves). *Pareuty, H. C. R.* 115 (1892) 109-.
- Discharge of 30 in. stop valve. *Smith, J. W.* Am. S. CE. T. 34 (1895) 235-.
- Distribution of velocities in circular pipe, widened at mouth, between entrance and establishment of uniform flow. *Boussinesq, J. C. R.* 113 (1891) 9-.
- — — pipes, new experiments. *Bazin, —.* C. R. 122 (1896) 1250-.
- Drainage of houses. *Carmichael, N.* [1880] Glasg. Ph. S. P. 12 (1880) 132-; Sc. S. Arts T. 10 (1883) 396-.
- , principles. *Clairmont, W. G.* Wien Jb. Gl. 3 (1852) 73-.
- Draining, deep, theory. *Clutterbuck, J. C.* Ag. S. J. 6 (1845) 489-.
- Drains of low-lying plains, formulæ for calculation. *Turazza, D.* Ven. I. Mm. 21 (1879) 189-.
- , tests for leaks. *Thomson, G.* [1898] Sc. S. Arts. T. 15 (1903) 16-.
- Effect of enlargements in pipes. *[Barré de] Saint-Venant, —.* C. R. 23 (1846) 147-.
- — — —. *Fliegner, A.* Civing. 21 (1875) 97-.
- — — — and channels. *Boussinesq, J. C. R.* 87 (1878) 491-.
- Elastic fluids. *Navier, C. L. M. H.* [1829] Par. Mm. Ac. Sc. 9 (1830) 311-.
- Equivalent orifices, theory. *Lafitte, —.* St. Ét. Bil. S. In. Mn. 11 (1897) 637-.
- Flood waves in sewers, and their automatic action. *Grover, A. J.* Am. S. CE. T. 28 (1893) 1-; 199-.



- Flow in sewers and water-mains. *Crimp, W. S., & Bruges, C. E.* I. CE. P. 122 (1895) 198-.
- Flushing in pipe sewers. *Ogden, H. N.* Am. S. CE. T. 40 (1898) 1-.
- Friction of air on walls of blast-pipe. *Rittinger, P.* Oestr. Z. Brgw. 4 (1856) 401-.
- in fluid passing from state of rest to one of motion. *Boussinesq, J. C. R.* 90 (1880) 736-.
- of fluid against solid. *Chaudy, F.* Par. Ing. Civ. Mm. (1896) (Pt. 2) 24-.
- and waste of water in mains. *Brush, C. B.* Am. S. CE. T. 19 (1888) 89-.
- of water. *Caligny, A. de.* Par. S. Phlm. PV. (1849) 58-; *Liouv. J. Mth.* 15 (1850) 169-.
- — — *Thomson, James, & Fuller, G.* CE. I. P. 14 (1854-55) 310.
- — — in conical pipes. *Weisbach, J.* Civing. 13 (1867) 1-.
- — — cylindrical pipes. *Busse, F. G. von.* Gilbert A. 34 (1810) 152-.
- — — against smooth surfaces. *Fink, F.* Civing. 38 (1892) 213-.
- — — solid surfaces of different degrees of roughness. *Unwin, W. C.* [1890] R. S. P. 31 (1881) 54-.
- in water-main. *Friend, C. A.* I. CE. P. 119 (1895) 271-.

## GASES.

- Girard, P. S.* [1819] Par. Mm. Ac. Sc. 5 (1821-22) 1-.
- Anon.* (vi 476) Franklin I. J. 29 (1855) 42-121-.
- Séguin, J. M.* Isère S. Bl. 4 (1860) 84-.
- Blochmann, G. M. S.* Civing. 7 (1861) 490-.
- Arson, A.* Par. Ing. Civ. Mm. (1863) 378-; (1867) 537-.
- Robinson, S. W.* V. Nost. Eng. Mg. 24 (1881) 370-.
- Haton de la Goupillière, J. N.* C. R. 103 (1886) 661-, 709-, 785-.
- Hugoniot, —.* C. R. 103 (1886) 922-, 1002-.
- (*Hugoniot.*) *Hirn, G. A.* C. R. 103 (1886) 1232-; 104 (1887) 102.
- (*Hirn.*) *Hugoniot, —.* C. R. 103 (1886) 1253-; 104 (1887) 46-.
- Baille, J. B.* J. de Ps. 8 (1889) 29-.
- efflux, and motion in pipes. *Hughes, S.* Civing. 1 (1854) 61-.
- Hirn's experiments.* *Faye, H. A. É.* C. R. 101 (1885) 849-.
- perfect, permanent motion. *Favero, G. B.* Rm. R. Ac. Linc. Mm. 1 (1894) 611-.
- permanent motion in channels and pipes. *Pérard, L.* Cuyper Rv. Un. 27 (1870) 51-.
- — — — *Grashof, (Prof.)* —.
- — — — Cuyper Rv. Un. 27 (1870) 61-, 387-, 461-; 30 (1871) 102-.
- under pressure. *Schmidt, G. G.* Gilbert A. 66 (1820) 39-.
- regulator for any pressure. *Ville, J. C. R.* 94 (1882) 724-; J. de Ps. 1 (1882) 321-.

- Gaspipes, testing for leakage. *Undeutsch, H.* Civing. 34 (1888) 199-.
- Hydraulic buffer. *Clerk, H.* B. A. Rp. (1869) (Sect.) 209.
- experiments made at Turin in 1783, results. *Michelotti, J. T.* Turin Mm. Ac. 2 (1784-85) 53-.
- problem, solution. *Ott, C. H.* Arg. S. Ci. A. 39 (1895) 284-.
- system of Italy. *Prony, R. de.* Par. Éc. Pol. J. 10<sup>e</sup> cah. (1810) 59-.
- Hydraulics, principles, new. *Auria, L. d'.* Franklin I. J. 75 (1878) 73-.
- , problem. *Dienger, J.* Arch. Mth. Ps. 41 (1864) 181-.
- , —. *Vasconcellos, A. O. de.* Lisb. J. Sc. Mth. 1 (1868) 279-.
- , problems. *Turazza, D.* A. Sc. Lomb. Ven. 10 (1840) 237-; Ven. At. 3 (1844) 348-.
- , — (Turazza). *Bellavitis, G.* Ven. At. 4 (1845) 14-.
- Hydrodynamic and electric phenomena, analogies. *Garnier, V.* Lum. Élect. 6 (\*1882) 344-, 402-, 424-, 446-.
- , —. *Du Moncel, T.* Lum. Élect. 6 (\*1882) 361-.
- Hydrodynamics, molecular motion in. *Troy, D. S.* Science 18 (1891) 202-.
- , Venturi's principle unnecessary. *Busse, F. G. von.* Gilbert A. 4 (1800) 116-.
- Hydrometric experiments on application of formulæ of Bernoulli and Borda. *Weisbach, J.* Civing. 13 (1867) 1-.
- Hydrometrograph. *Baader, J. von.* Edinb. Ph. J. 13 (1825) 271-.
- Law of motion of fluids in pipes. *Colding, L. A.* Kjöb. Ov. (1865) 1-.
- Liquid current with rectilinear and parallel filaments of any cross-section. *Lévy, M.* A. Pon. Chauss. 13 (1867) 237-.
- Liquids, laws for flow in small elastic pipes. *Arsonval, A. d'.* [1876] Par. S. Bl. Mm. 3 (1877) (C. R.) 357-.
- in narrow cylindrical pipes, theory. *Gromeka, I. S.* (xii) Kazan Un. Mm. (1882, Pt. 2) 41-.
- Loss of head. *Church, I. P.* Franklin I. J. 124 (1887) 351-.
- — — of air currents in underground workings. *Murgue, D.* [1893] St. Ét. Bl. S. In. Mn. 7 (1893) 5-; Am. I. Mn. E. T. 23 (1894) 63-.
- — — compressed air in pipes. *Cavalli, E.* Rm. R. Ac. Linc. Rd. 6 (1890) (Sem. 2) 187-.
- — — — and steam in pipes. *Ledoux, —.* A. Mines 2 (1892) 541-.
- — — by passage of water through 24 in. conduit. *Kuichling, E.* Am. S. CE. T. 26 (1892) 439-.
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*Belli, G.* Brugnatelli G. 10 (1827) 436-.

*Mohr, C. F.* Pogg. A. 32 (1834) 476-.

*Waltenhofen, A. von.* Wien SB. 17 (1855) 238-.

*Ransome, J. A.* Manch. Ph. S. P. 1 (1857-60) 181-.

*Thalén, R.* Ts. Mt. Fys. 1 (1868) 180-.

*Rouché, E.* N. A. Mth. 19 (1880) 42-.

*Sutton, H.* [1881] Viet. R. S. T. 18 (1882) 122-.

*Lubimov, N. A.* Fsch. Ps. (1890) (Ab. 1) 367-.

*Raps, A.* A. Ps. C. 55 (1895) 556-.

application. *Teissier, L. J.* J. de Ps. 2 (1883) 463-.

automatic. *Thomson, J. J.* Elect. 31 (1893) 588-.

- with automatic valve. *Körner, F. Kastner Arch. C. 5* (1832) 240-.
- bellows, theory. *Strait, H. Silliman J. 27* (1835) 88-.
- Berrenberg's, for glow-lamps. *W., J. H. Elekttech. Z. 21* (1900) 214-.
- Bianchi's, metallic connector for. *Swan, W. Ph. Mg. 37* (1869) 442-.
- Bunsen's. *Johnson, S. W. Am. J. Sc. 48* (1869) 113-.
- centrifugal. *Ruitov, M. (xii) Rs. Ps.-C. S. J. 14 (Ps.)* (1882) [(Pt. 1)] 10-.
- without clearance. *Pohl, G. F. Pogg. A. 32* (1834) 628-.
- *Schobl, E. Pogg. A. 84* (1851) 544-.
- *Gill, R. [1864] Ph. Mg. 32* (1866) 256-.
- and condenser. *Austin, G. Phil. Trans. (1813)* 138-.
- *Witty, W. Dingler 43* (1832) 445-.
- condensing. *Joule, J. P. Manch. Ph. S. P. 3* (1862-63) 5.
- and exhausting. *Hare, R. Am. Ph. S. T. 5* (1837) 385-.
- *Johnston, J. Silliman J. 34* (1838) 86-.
- *Bulk, C. Berl. B. 9* (1876) 1871-.
- *new tap for. Silbermann, J. J. C. R. 42* (1856) 1051-.
- construction and use. *Körner, F. Kastner Arch. C. 5* (1832) 250-.
- double acting. *Ritchie, W. R. I. J. 2* (1831) 288-.
- *with Babinet's tap, limit of exhaustion. Deventer, J. G. van. Batav. Ntk. Ts. 56* (1897) 183-.
- *single cylinder. Cramer, J. W. Gilbert A. 71* (1822) 103-.
- *Tate, T. Ph. Mg. 11* (1856) 297-, 360-.
- with double cylinder. *Clare, R. A. Nicholson J. 4* (1801) 264-.
- *Derode, V. Lille Tr. (1826-27)* 72-.
- exhausting, theory, and new hydrostatic air pump. *Silva Pinto, M. V. da. [1872-73] (xi) Libs. J. Sc. Mth. 4* (1873) 43-, 95-.
- forms, old and new. *König, W. Frkf. a. M. Ps. Vr. Jbr. (1896-97)* 32-.
- and gasometer and balance beam. *Patten, J. H. Silliman J. 9* (1825) 92-.
- hydraulic exhaust apparatus. *Wright, S. [1887-89] Sc. S. Arts T. 12* (1891) 227-.
- hydrodynamic. *Feilitzsch, F. C. O. von. N.-Vorp. Mt. 9* (1877) 118-.
- hydrostatic. *Romershausen, E. Kastner Arch. Ntl. 2* (1824) 359-.
- *Seaward, S. Tilloch Ph. Mg. 64* (1824) 441-.
- *Mile, J. Kastner Arch. Ntl. 15* (1828) 1-.
- *Christiansen, C. A. Ps. C. 146* (1872) 155-.
- *Jagn, N. [1872-73] A. Ps. C. 148* (1873) 317-; *A. C. Phm. 166* (1873) 208-.
- (Jagn). *Rennard, E. Phm. Z. Russl. (1873)* 257-.
- *Arzberger, F., & Zulkowsky, —. Lieb. A. 176* (1875) 327-.

- hydrostatic, condensing. *Seaward, S. Tilloch Ph. Mg. 64* (1824) 12-.
- *forms. Linnemann, E. Lieb. A. 177* (1875) 295-.
- *modification. Roster, G. (xii) Rv. Sc.-Ind. 12* (1880) 6-.
- improved, and barometer scale. *C., L. O. (vi Adds.) Nicholson J. 29* (1811) 105-.
- and McLeod gauge. *Bertin, A. A. C. 19* (1880) 231-.

*Mercury Air Pumps.*

- Clare, R. A. Nicholson J. 4* (1801) 264-.
- Morren, A. A. C. 4* (1865) 320-.
- Poggendorff, J. C. Berl. Mb. (1865)* 158-.
- Jolly, G. Carl Rpm. 1* (1866) 144-.
- Babo, C. H. L. von. Freiburg B. 4* (1867) 392-.
- Le Bon, G. Carl Rpm. 3* (1867) 267-.
- Busch, H. Pflüg. Arch. Pl. 2* (1869) 445-.
- Lachinov, D. A. [1873] (xii) Rs. C. Ps. S. J. 6 (Ps.)* (1874) [(Pt. 1)] 17-.
- Melliés, J. Toul. Mm. Ac. 5* (1873) 363-.
- Las Marismas, — de. C. R. 79* (1874) 676-.
- Mendelejeff, D. I. Berl. B. 7* (1874) 731-.
- Serravallo, G. (xii) Rv. Sc.-Ind. 13* (1881) 215-; *14* (1882) 401-.
- Romilly, — de. Par. S. Ps. Sé. (1885)* 94-.
- Bottomley, J. T. B. A. Rp. (1886)* 519-.
- Greiner, —, & Friedrichs, —. A. Ps. C. 29* (1886) 672-.
- Neesen, F. Berl. Ps. Gs. Vh. (1893)* 21-.
- Santel, A. Z. Instk. 13* (1893) 93-.
- Wood, R. W. A. Ps. C. 58* (1896) 205-.
- Neesen, F. Berl. Ps. Gs. Vh. (1897)* 83-.
- Tuma, J. Wien Ak. Sb. 106* (1897) (Ab, 2a) 473-.
- Chatelain, E. U. C. R. 128* (1899) 1131-.
- Debrun, C. Bordeaux S. Sc. PV. (1898-99)* 88-.
- Neesen, F. D. Ps. Gs. Vh. (1900)* 82-.
- adaptation for estimation of gases in blood. *Neesen, F. Z. Pl. C. 22* (1896-97) 478-.
- annular. *Antolik, K. Mth. Termt. Éts. 3* (1885) 135-; *Mth. Nt. B. Ung. 3* (1884-85) 40-.
- apparatus for connecting and disconnecting receiver under exhaustion. *Bottomley, J. T. R. S. P. 40* (1886) 249-.
- application of hydraulic power to. *Smith, F. J. Ph. Mg. 25* (1888) 313-; *29* (1890) 138-.
- automatic. *Couttolenc, G. C. R. 90* (1880) 920-.
- *Schuller, A. A. Ps. C. 13* (1881) 523-.
- *Raps, A. A. Ps. C. 43* (1891) 629-.
- *Morley, E. W. Am. J. Sc. 47* (1894) 439-.
- *Neesen, F. Z. Instk. 14* (1894) 125-; *A. Ps. C. 55* (1895) 732-.
- *Pupin, M. I. Am. J. Sc. 49* (1895) 19-.
- *Zoth, O. Z. Instk. 16* (1896) 65-.
- *Boas, H. Z. Instk. 16* (1896) 146-.
- *Kahlbaum, G. W. A. Z. Instk. 16* (1896) 151-.
- *Friedrichs, F. A. Ps. C. 62* (1897) 383-.



- automatic. *Jaumann, G.* Z. Instk. 17 (1897) 243-.
- , *König, W.* Frkf. a. M. Ps. Vr. Jbr. (1896-97) 33-.
- , *Greiner, —, & Friedrichs, —.* Cztg. Opt. 19 (1898) 113-.
- , *Lawrence, R. R.* Science 9 (1899) 510-.
- , different systems, comparison of efficiency. *Neesen, F.* Z. Instk. 15 (1895) 273-.
- , experiments. *Raps, A. A.* Ps. C. 48 (1893) 377-.
- , hydrostatic. *Babo, C. H. L. von.* [1878?] Freiburg B. 7 (1880) 350-.
- , regulator without tap for. *Jaumann, G.* A. Ps. C. 61 (1897) 204-.
- , *Schuller's*, efficiency. *Kiss, K.* Mth. Termnt. Éts. 12 (1894) 305-; Mth. Nt. B. Ung. 12 (1895) 47-.
- , simplification. *Neesen, F.* Z. Instk. 20 (1900) 205-.
- development. *Thompson, S. P.* Tel. J. 21 (1887) 556-, 587-, 610-, 632-, 659-.
- double acting, without tap. *Neesen, F.* A. Ps. C. 11 (1880) 522-.
- duplex. *Wood, R. W.* Ph. Mg. 41 (1896) 378-.
- Geissler's*, new form. *Rock, F.* Cztg. Opt. 4 (\*1883) 159-.
- Giovenale's* improvement (removal of mercury vapour). *Egidi, G.* Rm. N. Linc. At. 46 (1893) 43-.
- intermittent. *Prytz, K.* Ts. Ps. C. 29 (1890) 241-; A. Ps. C. 42 (1891) 191-.
- Kravogl's*. *Waltenhofen, A. von.* Wien SB. 44 (1861) (Ab. 2) 603-.
- limit of exhaustion. *Kraevich, K. D.* (xn) Rs. Ps.-C. S. J. 13 (Ps.) (1881) [(Pt. 1)] 335-.
- modification. *Neesen, F.* A. Ps. C. 3 (1878) 608-.
- , *Pflüger, E.* Pflüg. Arch. Pl. 44 (1889) 5-.
- , *Gréhan, N., & Henry, L. d'.* Par. S. Bl. Mm. 45 (1893) (C. R.) 534-.
- , of *Jolly's*. *Narr, F.* A. Ps. C. 25 (1885) 542-.
- modifications. *Guglielmo, G.* Tör. Ac. Sc. At. 19 (\*1883) 665-.
- periodic. *Smith, F. J.* Nt. 48 (1893) 320-.
- in Physical Cabinet at Karlsruhe. *Wucherer, G. F.* Kastner Arch. Ntl. 5 (1825) 329-.
- for rapid production of vacuum. *Berlemont, —, & Jouard, —.* C. R. 131 (1900) 110-; Par. S. Ps. Sé. (1900) 194-.
- simplifications; comparison of efficiency. *Neesen, F.* Z. Instk. 19 (1899) 147-.
- Sprengel*. *Devar, J.* Edinb. R. S. S. P. 7 (1872) 662-.
- , automatic. *Macaluso, D.* Spet. It. Mm. 8 (1879) (App.) 35-.
- , —, *Kahlbaum, G. W. A.* A. Ps. C. 53 (1894) 199-.
- , —, *Donle, W.* Z. Instk. 20 (1900) 78-.
- , for filling barometers and thermometers. *Francis, E. E. H.* [1875] C. N. 33 (1876) 68.
- , improvement. *Rood, O. N.* Am. J. Sc. 20 (1880) 57-.
- , —, *Usagin, I. F.* Rs. Ps.-C. S. J. 22 (Ps.) (1890) 229-; J. de Ps. 10 (1891) 592-.
- Sprengel*, inverted and worked backwards for raising mercury. *Smith, F. J.* Ph. Mg. 34 (1892) 115-.
- , limit of exhaustion. *Donkin, W. F. C.* N. 29 (1874) 125-.
- , modifications. *Guglielmo, G.* Rm. R. Ac. Linc. Rd. 6 (1890) (Sem. 2) 153-.
- , new form. *Gimingham, C. H.* [1876] R. S. P. 25 (1877) 396-.
- , —, *Müller, E.* A. Ps. C. 65 (1898) 476-.
- , self feeding. *Wells, H. L.* Am. J. Sc. 41 (1891) 390-.
- , for high vacua. *Rood, O. N.* Am. J. Sc. 22 (1881) 90-.
- , working. *Boas, H.* D. Ps. Gs. Vh. (1900) 246-.
- without taps. *Neesen, F.* (xn) Z. Instk. 2 (1882) 285-; 3 (1883) 245-; 9 (1889) 343-; A. Ps. C. 58 (1896) 415-.
- , —, *Chabaud, —.* C. R. 125 (1897) 101.
- , —, or movable joints. *Henriet, H.* C. R. 125 (1897) 22-.
- Töpler*, modification. *Karavodine, V.* J. de Ps. 2 (1883) 558-.
- , new form. *Hagen, E. B.* [1880] A. Ps. C. 12 (1881) 425-.
- , —, —, (*Hagen*). *Neesen, F.* A. Ps. C. 13 (1881) 383-.
- Töpler-Hagen*, modification. *Sundell, A. F.* Helsingf. Acta 14 (1885) 545-; 15 (1888) 169-.
- Weston*. *Nansouty, M. de.* Gén. Civ. 7 (1885) 289-.
- with free piston. *Deleuil, —.* C. R. 60 (1865) 571-; 64 (1867) 666.
- plate, inventor. *Gerland, E.* A. Ps. C. 2 (1877) 665-.
- , new form. *Terquem, A.* J. de Ps. 9 (1880) 346-.
- pressure changes in. *Golicyn, (Prince) B. B.* St. Pét. Ac. Sc. Bl. 5 (1896) xi-; 7 (1897) 409-.
- of Prince and of Cuthbertson. *Nicholson, W.* Nicholson J. 1 (1797) 119-.
- , —, —, —, *Adet, —.* A. C. 25 (1798) 126-.
- on principle of Torricellian vacuum. *Trail, T. S.* Nicholson J. 21 (1808) 63-.
- , —, —, —, (same principle as *Geissler's*). *Fafchamps, —.* A. Gén. Sc. Ps. 6 (1820) 101-.
- , —, —, —, *Kemp, K. T.* Edinb. J. Nt. Gg. Sc. 2 (1830) 95-.
- rotary. *Schulze-Berge, F.* A. Ps. C. 50 (1893) 368-.
- simplification of work with. *Bauer, K. L.* A. Ps. C. 20 (1883) 542-.
- substitute for taps in vacuum experiments. *Romilly, F. de.* Par. S. Ps. Sé. (1888) 351-.
- with taps, application of *Babinet's* improvement. *Hessler, F.* D. Nf. Vsm. B. (1843) 229-.
- theory. *Barrois, T.* Lille Tr. (1826-27) 77-.
- and construction. *Feilitzsch, F. C. O. von.* N.-Vorp. Mt. 5 & 6 (1874) 145-.



- for high vacua. *Joule, J. P.* Manch. Lt. Ph. S. P. 12 (1873) 43, 55-.
- *Swinburne, J. C.* N. 62 (1890) 183-.
- very perfect vacua. *Dewar, J., & Tait, P. G.* [1874-75] Edinb. R. S. P. 8 (1875) 348-, 628.
- vacuum formation, Plateau's experiment. *Mensbrugghe, — van der.* Brux. S. Sc. A. 23 (1899) (Pt. 1) 10-.
- in given space, work performed. *Koláček, F.* A. Ps. C. 159 (1876) 643-.
- , preservation. *Charière, A., & Midre, —.* Lyon S. Ag. A. 4 (1860) 181-.
- produced by. *Auerbach, F.* A. Ps. C. 41 (1890) 364-.
- , production by centrifugal force of mercury. *Plateau, J. A. F.* Brux. Ac. Bil. 9 (1842) (pte. 2) 178-.
- without artificial valves. *Ritchie, W.* Thomson A. Ph. 12 (1826) 153-.

Applied mechanics, general principles and theorems; calculation of work transmitted by liquid masses. *Reech, F.* (vi Add.) C. R. 16 (1843) 1356-.

Bellows with continuous draught. *Madelaine, —.* A. Mines 4 (1819) 271-.

## BLOWING MACHINES.

- Rambourg, —.* (vi Add.) J. Mines 7 (1797-98) 105-.
- Beaunier, —, & Gallois, —.* J. Mines 16 (1804) 37-.
- Clapeyron, E.* A. Mines 7 (1822) 3-.
- Aubuisson de Voisins, J. F. d'.* A. Mines 9 (1824) 521-; 11 (1825) 161-; 4 (1828) 210-.
- Caligny, A. de.* C. R. 19 (1844) 1267-.
- Furiet, —.* A. Mines 11 (1857) 681-.
- Caligny, A. de.* Liouv. J. Mth. 13 (1868) 43-.
- Ihering, A. von.* Wien Berg.-Hm. Jb. 40 (1892) 381-.
- Kennedy, J.* [1893] Am. I. Mn. E. T. 22 (1894) 537-, 709-.
- bucket-wheel. *Wellner, G.* Wien Berg.-Hm. Jb. 28 (1880) 93-.
- changes in working. *Hauer, J. von.* Oestr. Z. Brgw. 14 (1866) 156-.
- with constant blast. *Braun, —.* Dingler 68 (1838) 34-.
- cylinder. *Baader, J. von.* J. Mines 25 (1809) 81-, 161-.
- , maximum of suction. *Wellner, G.* Wien Berg.-Hm. Jb. 25 (1877) 8-.
- , new apparatus for. *Nordenskiöld, N.* Jern-Kont. A. 6 (1823) 204-.
- experiments. *Lampadius, W. A.* Schweigger J. 19 (1817) 319-.
- *Tardy, —, & Thibaud, —.* A. Mines 8 (1823) 595-.
- fan. *Saint-Léger, — de.* A. Mines 7 (1835) 295-; 11 (1837) 89-.
- *Burdin, —.* A. Mines 10 (1836) 471-.
- *Münster, E.* N. Mg. Ntvd. 6 (1851) 89-.
- *Rankine, W. J. M.* Glasg. T. I. Eng. 1 (1857-58) 25-.

- for giving supply of coal-gas under pressure for sensitive flames. *Marshall, F. H.* B. A. Rp. (1874) (Sect.) 42.
- of Francis Gréhant. *Gréhant, N.* Par. S. Ps. Sé. (1888) 374-, 375-.
- with hot blast. *Buff, H.* Pogg. A. 37 (1836) 196-.
- hydraulic. *Baader, J. von.* J. Mines 29 (1811) 51-.
- *Marignac, C. de.* A. Mines 1 (1842) 69-.
- (Lüders). *Frapolli, L.* A. Mines 12 (1847) 391-.
- *Buff, H.* Lieb. A. 79 (1851) 249-.
- , indicator diagrams. *Firmstone, F.* Am. I. Mn. E. T. 7 (\*1879) 339-.
- Lafaye's tympanum. *Lebette, L. P.* A. Mines 6 (1844) 113-.
- regulators for. *Baillet, A.* J. Mines 14 (1803) 188-, 302-.
- Upper Assam. *Mallet, F. R.* I. Gl. Sv. Rc. 10 (1877) 152-.
- useful effect. *Buff, H.* Gött. Vr. Stud. 4 (1841) 393-.
- volume of air. *Aubuisson de Voisins, J. F. d'.* J. Mines 38 (1815) 155-.
- — —, calculation. *Koch, F. K. L.* [1832] Gött. Stud. Vr. 3 (1833) 27-.
- — —, tables. *Neuschild, C.* Berg.-Hm. Ztg. 18 (1859) 27-.
- — —, —. *Hauer, J. von.* Wien Berg.-Hm. Jb. 24 (1876) 74-.
- — — corresponding to given height of manometer. *Weisbach, J.* Schlömilch Z. 6 (1861) 421-.
- working at high velocities. *Slate, A.* Franklin I. J. 23 (1852) 32-.

- Carbon dioxide as motive power. *Baggs, J.* (vi Add.) Majocchi A. Fis. C. 9 (1843) 210-.
- — — —, and ammonia. *Hutchinson, H. N.* Rugby NH. S. Rp. 6 (1872) 28-.
- — — press. *Kobell, F.* von. Münch. Nt. Tech. Com. Ab. 1 (1857) 75-.

## COMPRESSED AIR.

- apparatus for sinking mine-shafts, etc. under water and in submerged sand. *Triger, —.* C. R. 13 (1841) 884-.
- application in mechanics. *Cederblom, J. E.* Jern-Kont. A. 32 (1877) 456-; Berg.-Hm. Ztg. 37 (1878) 23-; 38 (1879) 107-.
- for coal cutting machinery. *Firth, W. B. A.* Rp. 43 (1873) 175-.
- energy. *Perrigault, —.* Les Mondes 26 (1871) 431 [441]-.
- engines. *Delisle, —.* Lille Tr. (1826-27) 101-.
- *Sekowski, A.* Par. T. Nauk Śc. Pam. 7 (\*1875) Art. 4, 15 pp.
- in foundries. *Pedrick, H. A.* Am. Eng. & Railroad J. 69 (1895) 357-.
- machinery for underground haulage. *Daniel, W. I.* ME. P. (1874) 204-.
- in making foundations. *Faton, —.* Gen. Bil. I. Nt. 16 (1870) 267-.



- transmission of power by. *Robert, P. R.*  
I. Mn. Mtl. T. 4 (1895-96) 216-.
- — —. *Walker, W. G.* B. A. Rp. (1898)  
994.
- — —, diameter of tube. *Tédasco, N. de.*  
Gén. Civ. 15 (1889) 338-.
- — —, experiments at St Gothard tunnel.  
*Stockalper, E.* Cuyper Rv. Un. 7 (1880)  
257-.
- — — to vehicle with piston, without  
variation of circulating air. *Codazza, G.*  
Tor. Mm. Ac. 26 (1871) 291-.
- use. *Pelletan, P. C. R.* 8 (1839) 545-.
- in glass blowing. *Appert, —.* C. R. 96  
(1883) 1635-; St. Et. Bil. S. In. Mn. 12  
(1883) 855-.
- useful effect. *Trasenster, L.* Cuyper Rv. Un.  
3 (1878) 1-.
- and water for dredging reservoir-dams. *Calmels,*  
*M. As. Fr. C. R.* 10 (1881) 243-.
- water, steam, etc. for transmission of power.  
*Robinson, H.* I. CE. P. 49 (1877) 1-.

- Compressed gas for pumping fluids and ex-  
cluding water from bore-holes. *Noth, J.*  
Wien Berg.-Hm. Jb. 22 (1874) 326-.
- Compression of gases, application of steam jets.  
*Siemens, C. W.* Dingler 207 (1873) 265-.
- Dredging. *Bazin's* sand-pump. *Collignon, E.*  
(ix) Par. S. Phlm. Bil. 10 (1873) 107-.
- implement, new. *Marshall, A. M.* [1882]  
Nt. 27 (1883) 11.
- Electric transmission from Niagara. *Rhodes,*  
*B.* [1884] Am. S. CE. T. 14 (1885) 205-.
- Expansion diagrams. *Enys, J. S.* Cornwall  
Pol. S. T. (1838) 154-.
- Flush-reservoir, dimensions, pressure on sluice-  
valve and opening of latter. *Cousin, L.*  
[1878] (xii) Brux. S. Sc. A. 3 (1879) (Pt. 1)  
66-.
- Gas-compressors, use of oil in. *Strombeck,*  
*H. von.* Franklin I. J. 133 (1892) 297-.
- Hydraulic apparatus for evolution of ships.  
*Boucher, R.* Rv. Mar. et Col. 43 (1874)  
822-.
- — — naval guns. *Le Breton, (le lt.) H.*  
Rv. Mar. et Col. 123 (1894) 564-; 124 (1895)  
595-; 125 (1895) 38-.
- — — swing bridges. *Michaëlis, N. T.*  
's Gravenh. I. Ing. Ts. (1869-70) 300-.
- brake. *Cavallero, A.* Tor. Ac. Sc. At. 10  
(1875) 577-.
- brake-buffers. *Wehage, H.* Civing. 29  
(1883) 507-.
- brakes. *Laurent, P.* Rv. Artl. 23 (1883)  
207-.
- — — continuous and automatic. *Barker,*  
*E. D.* [1879] Eng. S. T. (1880) 75-.
- — — for gun-carriages. *Canet, (le lt.) G.* Rv.  
Artl. 13 (1879) 436-; 22 (1883) 289-.
- — — — (naval guns). *Pugibet, (le lt.)*  
*H.* Rv. Mar. et Col. 124 (1895) 281-.
- cranes. *Bleckmann, T.* 's Gravenh. I. Ing.  
Vh. (1859-60) 1-.
- and electric energy, analogy. *Lauriol, J.*  
Gén. Civ. 8 (1885-86) 172-, 183-.

## HYDRAULIC ENGINES.

- Trevithack, R.* Nicholson J. 1 (1802) 161-.
- Harriott, J.* Nicholson J. 4 (1803) 44-.
- Farey, J.* Tilloch Ph. Mg. 37 (1811) 3-.
- Taylor, Joh.* Tilloch Ph. Mg. 37 (1811) 129-.
- (Mannoury-Dectot.) [Carnot, L. N. M. non]  
*Delambre, J. B. J.* [1812-13] J. Mines 33  
(1813) 65-; 34 (1813) 213-.
- Brunacci, V.* Mil. Mm. I. Lomb. Ven. 3 (1816-  
17) 285-.
- Rous[s]elle-Galle, —.* A. Mines 3 (1818) 489-;  
5 (1820) 465-.
- Dickson, J.* Edinb. Ph. J. 3 (1820) 176-.
- Eve, J.* QJ. Sc. 22 (1827) 247-.
- Dakeyne, J.* Dingler 43 (1832) 171-.
- Juncker, —.* A. Mines 8 (1835) 95-, 247-,  
369-.
- (Juncker.) *Arago, D. F. J.* A. C. 60 (1835)  
202-.
- Glynn, J.* B. A. Rp. (1848) 11-.
- Armstrong, W. G.* (vi Add.) CE. I. P. 9  
(1849-50) 375-.
- Caligny, A. de.* Par. S. Phlm. PV. (1850) 70-,  
79-.
- Armstrong, W. G.* B. A. Rp. (1854) 417-;  
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(1892) 175-.

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*Capell, (Rev.) G. M.* [1892] N. Eng. I.  
Mn. E. T. 42 (1893) 57-.

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(1876) 10-.

— *Gosseries, É.* Rv. Un. Mines 31 (1895)  
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—, experiments. *Brown, E.* Fed. I. Mn. E.  
T. 4 (1893) 532-; 5 (1893) 376-.

— and Rittinger, Körting exhausters and  
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Brgw. 28 (1880) 287-, 299-, 313-, 323-,  
336-, 345-, 364-.

manometric efficiency. *Capell, (Rev.) G. M.*  
N. Eng. I. Mn. E. T. 42 (1893) 278-.

"medium." *Lupton, A.* [1889] Fed. I. Mn.  
E. T. 1 (1892) 65-, 304-.

new. *Bowlker, T. J.* N. Eng. I. Mn. E. T.  
31 (1882) 93-.

— *Oswald, R.* [1899] I. Mn. E. T. 18  
(1900) 458.

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and positive blowers, comparative efficiency.  
*Howe, H. M.* Am. I. Mn. E. T. 10 (\*1882)  
482-.

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[1893] N. Eng. I. Mn. E. T. 43 (1894)  
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*(Rev.) G. M.* Fed. I. Mn. E. T. 3 (1892)  
196-; 4 (1893) 424-.

Waddle. *Brown, M. W.* [1891] N. Eng. I.  
Mn. E. T. 40 (1892) 75-; 41 (1893) 19-.

— and Capell, experiments. *Hendy, J. C. B.*  
[1893] Fed. I. Mn. E. T. 4 (1893) 474-;  
6 (1894) 188-, 407-.

helicoidal. *Laponche, A.* Gén. Civ. 35 (1899)  
109-.

—, theory. *Einbeck, J.* Dingler 240 (1881)  
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mechanical. *Engelcke, G.* Z. Berg.-H.-Salw.  
38 (1890) (Ab.) 287-.

— *Brown, M. W.* [1900] N. Eng. I. Mn.  
E. T. 48 (1900) (App.) 171-; 50 (1903)  
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— *Trasenster, L.* [1845] Liège Mm. S.  
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— *Brunton, W.* B. A. Rp. (1849) (pt. 2)  
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— *Nyst, F.* Cuyper Rv. Un. 7 (1860)  
326-.

— *Bornemann, K. R.* Civing. 7 (1861)  
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— *Murgue, D.* St. Ét. Bll. S. In. Mn. 2  
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— *Balzberg, K. von.* Wien Berg.-Hm.  
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— *Gendebien, A.* [1882] Cuyper Rv.  
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—, Lemielle system. *Laurent, C. N.* Eng.  
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— *Macquet, A.* Rv. Un. Mines 20 (1892)  
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*A. von.* D. Nf. Vsm. B. (1836) 112-.

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— *Marum, M. van.* Haarl. Ntk. Vh. 1  
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- , *Rennie, (Sir) J.* Weale Q. Pp. 4 (1845) 24 pp.
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- , Sheffield, failure. *Aytoun, R.* [1864]  
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- Stahl, A. W.* *Rv. Sc.* 50 (1892) 314-.
- Linden, H.* *Nt.* 47 (1892-93) 438-.
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- — —, variation of density. *Atkinson,*  
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- , Murgue recording volumetric. *Murgue, D.*  
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- , —. *Sutton, H.* Aér. S. Rp. 13 (1878) 30-.
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- Cherbourg to London by. *Lhoste, F., & Mangot, J.* Aér. (1886) 163-.
- collodion. *Grüel, C. A.* Pogg. A. 75 (1848) 333-.
- conditions of aerial navigation by. *Louvrié, — de.* Cosmos 6 (1867) 14-.
- control by pressure. *Heath, J.* Aér. S. Rp. 3 (1868) 5-.
- crossing Atlantic by. *Durand-Gréville, E.* Rv. Sc. 42 (1888) 237-.
- Baltic by means of guide-rope. *Andrée S. A.* Aér. (1893) 275-.

crossing Channel by Pollock. *Spencer, P.* Aer. J. 2 (1898) 20-.  
 — Sahara by. *Dex, L.* Rv. Sc. 14 (1900) 720-.  
 determination of path. *Valz, B.* An. Mét. Fr. (1850) 139-.  
 deviation by guide-ropes. *Drouillard, —.* Aér. (1900) 232-.

## DIRIGIBLE BALLOONS.

*Dupuy de Lôme, —.* C. R. 71 (1870) 502-; 545-, 549-.  
 (Dupuy de Lôme.) *Fonvielle, W. de.* Aér. 3 (1870) 173-.  
*Sorel, —.* C. R. 71 (1870) 729-.  
*Labrousse, C.* C. R. 72 (1871) 65-.  
*Dupuy de Lôme, —.* C. R. 74 (1872) 337-; 345-.  
 (Haenlein.) *Frion, O.* Aér. 9 (\*1876) 293-.  
 (Tissandier.) *Richou, G.* [1883] Gén. Civ. 4 (\*1883-84) 23-.  
*Talansier, C.* Gén. Civ. 5 (1884) 303-.  
 (Renard and Krebs.) *Duroy de Bruignac, —.* Gén. Civ. 5 (1884) 333-.  
*Stapfer, D.* Gén. Civ. 5 (1884) 334-.  
*Lenicollais, L.* Aér. (1885) 83-.  
*Jardim, C.* Libs. J. Sc. Mth. 12 (1888) 247-.  
*Labrousse, —.* Aér. (1892) 34-.  
*Danilevsky, C.* Dingler 310 (1898) 161-; Aér. (1898) 279-; (1899) 33-.  
*Anon.* Aer. J. 2 (1898) 87-.  
*Barton, —.* Aer. J. 3 (1899) 73-.  
*Hervé, H.* Rv. Sc. 11 (1899) 138-.  
 aluminium. *Moedebeck, (Capt.) —.* Aer. J. 2 (1898) 11-.  
 best form for bow. *Daubanton, C. A.* Aér. 4 (1871) 113-.  
 with compressed air motor. *Haenlein, P.* Aér. (1885) 193-.  
 compressed hydrogen for. *Cadisch, H.* Rv. Sc. 39 (1887) 124-.  
 of Cordenons. *Da Schio, (il conte) A.* Ven. I. At. (1887-88) 1355-.  
 electric. *Tissandier, G.* C. R. 97 (1883) 831-; Aér. (1883) 223-; (1884) 23-.  
 —. *Buchholtz, (Maj.) —.* Elekttech. Z. 5 (1884) 431-.  
 —. *Renard, C., & Krebs, A.* C. R. 99 (1884) 316-.  
 —. (Renard and Krebs.) *Caron, F.* Aér. (1884) 163-.  
 —. (— —). *Tissandier, G.* Aér. (1884) 183-.  
 —. *Tissandier, G.* Science 3 (1884) 152-; 196-.  
 —. (Renard and Krebs), effect of wind pressure. *Lenicollais, L.* Aér. (1884) 187-.  
 —, experiments. *Tissandier, G.* C. R. 99 (1884) 530-.  
 —. (Renard and Krebs), experiments. *Hervé-Mangon, —.* C. R. 99 (1884) 772-.  
 —. (— —) "La France," experiments, 1885. *Renard, C.* C. R. 101 (1885) 1111-; Rv. Sc. 36 (1885) 692-.  
 mathematical conditions. *Sallé, A.* Aér. (1892) 33-.  
 navigation. *Dex, L.* Rv. Sc. 50 (1892) 743-.

possible forms. *Laussedat, —.* C. R. 99 (1884) 413-.  
 requirements. *Dupuy de Lôme, —.* C. R. 99 (1884) 341-.  
 of Santos-Dumont. *Fonvielle, W. de.* Aér. (1898) 207-.  
 —. *Sibillot, C.* Aér. (1898) 205-.  
 theory. *Helmholtz, H.* [1872] Dingler 207 (1873) 465-.  
 —. *Braneanu, M., & X....* [Bucarest S. Sc. Bl. 3 (1894)] 97-.  
 —. (Braneanu.) *Haret, S., Hepites, S., & Negreanu, D.* [Bucarest S. Sc. Bl. 3 (1894)] 101-.  
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 —. *Anon.* Aer. J. 1 (1897) (No. 1) 13.  
 Zeppelin airship. *Anon.* Aer. J. 3 (1899) 75-.  
 —. *Mazim, H. S.* Aer. J. 4 (1900) 144-.  
 —. *Stolberg, A.* [1900] Nt. 63 (1900-01) 187.  
 —, ascent Oct. 17, 1900. *Wolf, E.* Nt. 62 (1900) 626.  
 effect of solar heat in raising. *Rae, J.* Silliman J. 33 (1838) 196-.  
 elastic, automotor. *Duponchel, A.* Les Mondes 6 (1883) 605-; Rv. Sc. 33 (1884) 709-.  
 ellipsoidal, motion. *Mossotti, O. F.* Brugnattelli G. 4 (1821) 415-.  
 first inventor. *Wurzer, F.* Marb. Schr. 2 (1831) 205-.  
 —, Brazilian. *Freire de Carvalho, F.* Rio Rv. 5 (1849) 336-.  
 flying fish, an aeronautical experiment. *Duponchel, A.* Rv. Sc. 6 (1883) 236-.  
 free, equilibrium and motion. *Pomorcev, M.* M. Rs. Ps.-C. S. J. 24 (Ps.) (1892) 74-.  
 —, photography from. *Desmarests, P.* Aér. 13 (\*1880) 235-.  
 —, vertical motion. *Hergesell, —.* Nt. 60 (1899) 400.  
 of future. *Dex, L.* Rv. Sc. 51 (1893) 623-.  
 gas balloons, instability. *Aimé, E.* [1894] Gén. Civ. 26 (1894-95) 107-.  
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 height beyond reach of projectiles. *Tissandier, G.* Aér. 9 (\*1876) 67-.  
 — and velocity, determination by pendulum. *Popov, A., Th.* St. Pet. Ac. Sc. Mm. (Rs.) 11 (\*1867) 97-.  
 high ascent. *Hazen, H. A.* Am. Eng. & Railroad J. 69 (1895) 337-.  
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- as instruments of scientific research. *Bacon*, (Rev.) *J. M.* Nt. 59 (1898-99) 447-.
- kite balloon, captive. *Archibald*, *E. D.* Nt. 36 (1887) 278.
- , —. *Anon.* *Rv. Mar. et Col.* 139 (1898) 98-.
- , —, new German. *Anon.* *Aer. J.* 1 (1897) (No. 4) 18.
- balloons and tandems. *Archibald*, *D.* *Aër.* S. Rp. 22 (1890) 5-.
- law of ascent and horizontal transport. *Morin*, *A. J.* C. R. 67 (1868) 635-.
- as means of locomotion. *Dex, L., & Dibos, M.* *Rv. Mar. et Col.* 113 (1892) 234-, 498-; 114 (1892) 155-, 228-, 502-; 115 (1892) 39-, 232-.
- metallic. *Gouttes*, —. *As. Fr. C. R.* (1895) (Pt. 1) 227.
- military. *Rameau, L.* *Aër.* (1885) 183-.
- *Duponchel, A.* *Rv. Sc.* 39 (1887) 141-.
- in military reconnaissances, etc. *Lomet*, (*baron Des Foucaux*) *A. F. Par. Ec. Pol. J.* 11<sup>e</sup> cah. (1801-02) 252-.
- modified. *Le Hir*, —. C. R. 72 (1871) 122.
- as motors. *Popper, J.* *Wien Ak. Sb.* 71 (1875) (Ab. 2) 809-; *Dingler* 224 (1877) 13-.
- necessity for testing resistance of fabrics. *Montucci, H.* C. R. 71 (1870) 692-.
- proposed by *Lana* (1670). *Cumberland, G.* *Q. J. Sc.* 1 (1828) 29-.
- propulsion, power required. *Mondot de Lagorce*, —. *Par. Bil. S. Aérost.* 1 (1852) 105-.
- , —. *Wetter, J.* *Aër. S. Rp.* 22 (1890) 20-.
- by reaction of jet. *Thayer, R.* [1883] *Am. Ph. S. P.* 21 (\*1884) 301-.
- with sails. *Andrée, S. A.* [1894] *Stockh. Ak. Hndl. Bh.* 20 (*Afd.* 2) (1895) No. 6, 25 pp.; *Aër.* (1895) 125-.
- signalling in war. *Bruce, E.* *Aër. S. Rp.* 21 (1886) 55-.
- spherical, problem. *Ocagne, M. d'.* *Par. S. Phlm. Bil.* 5 (1893) (*C. R.*, No. 18) 2.
- steam-. *Giffard, H.* C. R. 71 (1870) 683-.
- steering. *Evans, J.* *Tilloch Ph. Mg.* 46 (1815) 321-.
- (*Lurtzing*). *Kopp, E.* *Strasb. S. H. Nt. Mm.* 3 (1840) (*CCG.*) 36 pp.
- *Roussell, M.* *Amiens Mm. Ac.* (1848-50) 141-.
- *Gabussi, C.* *Tortolini A.* 7 (1856) 148-.
- *Luntley*, —. *Aër. S. Rp.* 3 (1868) 49-.
- *Tissandier, G.* *Rv. Sc.* 5 (1883) 322-.
- *Duroy de Brignac*, —. C. R. 99 (1884) 437-.
- *Landur*, —. *Aër.* (1884) 194-.
- *Laussead, (le col.)* —. *Aër.* (1884) 207-.
- *Flammarion, C.* *As. (Civ.) Mm.* (1893) (Pt. 1) 223-.
- *Mocquery*, —. *Dijon Ac. Sc. Mm.* 5 (1896) lxxxii-.
- , application of electric motors and of Planté's secondary cells. *Tissandier, G.* C. R. 93 (1881) 254-.
- , —, theorem on geometrically similar motions of fluid bodies. *Helmholtz, H.* *Berl. Mb.* (1873) 501-.

- steering during ascent and descent. *Biddle, D.* *Aer. J.* 3 (1899) 37-.
- by electricity. *Fonvielle, W. de.* *Lum. Élect.* 13 (1884) 500-.
- and liquefied gases. *Errera, L.* *Rv. Sc.* 10 (1898) 215.
- by variations of wind. *Guérout, G.* C. R. 109 (1889) 833.
- theory. *Valer, P.* *Aër.* (1886) 63-, 86-.
- (*Valer*). *Chamard, J.* *Aër.* (1886) 125-.
- , dynamic. *Duponchel, A.* *Les Mondes* 5 (1883) 406-, 439-, 638-; 6 (1883) 19-.
- , thermo-dynamic. *Sallé, A.* *Aër.* (1890) 286-.
- transformation of energy in motion of. *Caprilli, A.* *Ven. I. At.* (1891-92) 857-.
- utilisation of air currents. *Dex, L., & Dibos, M.* *Rv. Mar. et Col.* 132 (1897) 286-, 479-; 133 (1897) 18-, 252-, 533-; 134 (1897) 101-, 336-.
- valveless, voyage. *Anon.* *Aer. J.* 4 (1900) 99-.
- of variable volume. *Renard, C.* *Aër.* 14 (1881) 97-, 121-, 145-, 169-, 193-.
- vertical equilibrium. *Graffigny, H. de.* *Rv. Sc.* 12 (1899) 837-.
- motion. *Francesco, D. de.* *Nap. Rd.* 36 (1897) 153-.
- and equilibrium, theory. *Valerio, P.* *Vosg. S. Ém. A.* (1896) 205-.
- , method of estimating. *Duboin, A.* C. R. 112 (1891) 1251-.
- in warfare. *Bruce, E. S.* [1886] *Nt.* 35 (1887) 259-.
- *Espitalier*, —. *Rv. Sc.* 52 (1893) 449-, 493-.
- *Anon.* *Aer. J.* 4 (1900) 96-.
- wedge-shaped. *Wellner, G.* *Dingler* 252 (1884) 394-.
- wood-gas for. *Hureau de Villeneuve, A.* C. R. 71 (1870) 767-.
- work expended in ascent between 2 levels of equilibrium, formula. *Valer, P.* *Aër.* (1891) 51-.
- Boomerangs. *Walker, G. T.* [1897] *Phil. Trans.* (A) 190 (1898) 23-.
- Fall of bodies from great height. *Finck, B.* C. R. 56 (1863) 957-.
- body along a parabola. *Dienger, J.* *Grunert Arch.* 11 (1848) 88-.
- light bodies in air, retardation. *Prevost, B. A. C.* 10 (1819) 234-.
- Friction between water and air. *Lang, V. von.* [1876] *Phil. Trans.* 166 (1877) 589-.
- Frictional effect of railway trains on air. *Nipher, F. E.* *St. Louis Ac. T.* 10 (1900) 215-.
- Mechanical action on air. *Phillips, W. H.* *Aër. S. Rp.* 14 (1879) 16-.
- Parachute. *La Landelle, G. de.* *Aër.* (1884) 150-.
- , Cocking's experiment. *Green, C.* *Froriep Not.* 3 (1837) 145-.
- , descent of *Garnerin*, 1797. *Say, J. B.* *Gilbert A.* 16 (1804) 16-.
- , *Fontaine's. Comte, L.* *A. Mines* 1 (1852) 169-; 2 (1852) 553-.



Parachutes, invention and early experiments with. *Prieur, C. A.* A. C. 31 (1799) 269-; 36 (1800) 94.  
 —, velocity of descent. *Mondot de Lagorce, —.* Par. Bil. S. Aérost. 1 (1852) 105-.

## PROJECTILES.

*Mach, E.* Wien Ak. Sb. 101 (1892) (Ab. 2a) 977-.  
 elongated shot, rotary motions, theory and experiment. *Cranz, C.* Z. Mth. Ps. 43 (1898) 133-, 169-.  
 experiments. *Mach, L.* Wien Ak. Sb. 105 (1896) (Ab. 2a) 605-.  
 flying bullets, photographs. *Eder, —.* Wien Pht. Cor. 23 (1886) 363.  
 —, photography. *Mach, —.* Wien Pht. Cor. 21 (1884) 287-.  
 —, —, *Boys, C. V.* Phot. J. 16 (1892) 199-.  
 —, —, by light of electric spark. *Boys, C. V.* Nt. 47 (1892-93) 415-, 440-; Un. Serv. I. J. 37 (1893) 855-.  
 form of least resistance. *Witzschel, B. von.* Pogg. A. 93 (1854) 297-.  
 —, —, —, *Turleton, F. A.* Ph. Mg. 34 (1867) 377-.  
 grapho-ballistics based on Krupp's table. *Cranz, C.* Z. Mth. Ps. 42 (1897) 183-.  
 motion. *Gautier, P.* Par. Éc. Norm. A. 5 (1868) 7-; C. R. 69 (1869) 1061-.  
 —, *Sparre, (le comte) — de.* Brux. S. Sc. A. 15 (1891) (Pt. 2) 55-.  
 —, *Chapel, —.* C. R. 120 (1895) 677-.  
 —, approximate formulæ. *Alexander, P.* [1886] Glasg. Ph. S. P. 18 (1887) 237-.  
 —, of disk-shaped shot. *Goriačev, D. N.* Mosc. S. Sc. Bil. 73 (No. 1) (1891) 16-; Fsch. Ps. (1891) (Ab. 1) 287.  
 —, photographs. *König, A.* Berl. Ps. Gs. Vh. (1888) 77.  
 oblong, friction of air on. *Résal, H.* N. A. Mth. 12 (1873) 561-.  
 path of rotating spherical projectile. *Tait, P. G.* [1893-96] Edinb. R. S. T. 37 (1895) 427-; 39 (1900) 491-.  
 photographic study. *Mach, E., & Salcher, P.* Wien Ak. Sb. 98 (1890) (Ab. 2a) 41-.  
 —, —, *Mach, E., & Mach, L.* Wien Ak. Sb. 98 (1890) (Ab. 2a) 1310-.  
 photography. *Mach, E., & Salcher, P.* Wien Ak. Sb. 95 (1887) (Ab. 2) 764-.  
 —, Mach and Salcher's experiments. *Freyberg, J.* Dresden Isis Sb. (1891) 31-.  
 —, of phenomena produced in air. *Riegler, S.* Term. Közl. 21 (1889) (Suppl.) 29-.  
 rockets, motion. *Ruffini, P.* (viii) Mod. Mm. Ac. Sc. 1 (1833) (pte. 2) 56-.  
 —, —, and firing. *Münster, —.* Metz Mm. Ac. 11 (1829-30) 114-.  
 small shot, velocity and energy. *Rigby, J.* Dubl. S. Sc. P. 4 (1885) 25-.  
 spherical. *Ostrogradsky, —.* [1840] (viii) St. Pét. Ac. Sc. Bil. 8 (1841) 133-.  
 —, *Saint-Loup, L.* (xii) Strasb. S. Sc. Bil. 2 (1869) 59-, 65-.  
 sporting guns, limit of effective range. *Metz-Noblat, A. de.* Nancy S. Sc. Bil. (1893) 51-.

trajectories of shot, approximate formulæ. *Adams, J. C.* Nt. 41 (1890) 258-.  
 —, —, to reach hidden object. *Cuzac, (le lt.) —.* Rv. Mar. et Col. 127 (1895) 513-.  
 velocity, measurement. *Holden, (Capt.) H. C. L.* I. & S. I. J. (1891) (No. 2) 12-.

Recoil produced by explosion of compressed gas as motive power for balloons and submarine boats. *Morey, —.* Nancy Mm. Ac. Stanislas (1861) 1-.

RESISTANCE OF AIR. (See also  
1610 Resisting Media.)

*Burja, —.* Berl. Mm. Ac. (1804) 3-.  
*Samuelson, A.* Civing. 11 (1865) 323-; 13 (1867) 27-, 75-.  
*Page, C. E.* [1877-79] Rv. Artl. 11 (1878) 254-, 345-, 457-, 561-; 13 (1879) 531-; 14 (1879) 38-; 15 (1879) 128-.  
*Pachkiévitch, (le capit.) —.* [1878] Rv. Mar. et Col. 61 (1879) 20-.  
*Geoffroy, L.* Aér. 11 (1879) 7-.  
*Recknagel, G. A.* Ps. C. 10 (1880) 677-; D. Nf. Tbl. (1884) 146; Pollichia (43-46) (1888) 31-.  
*Touche, (le lt.-col.) P.* Aér. (1890) 217-; (1892) 123-; (1893) 126-; (1894) 99-.  
*Jäger, G.* Wien Ak. Sb. 106 (1897) (Ab. 2a) 1118-.  
*Canovetti, C.* Brescia At. Cm. (1899) 133-.  
 action on bodies of different shapes, especially projectiles. *Kummer, E. E.* Berl. Ak. Ab. (1875) (Mth.) 57 pp.  
 apparatus. *Liais, E.* C. R. 52 (1861) 696-.  
 balloons. *Durand-Claye, L., & Hervé-Mangon, —.* A. Pon. Chaus. 1 (1871) 227-.  
 Cailletet's experiments. *Fonvielle, W. de.* Lum. Élect. 45 (1892) 69-.  
 calculation. *Touche, (le lt.-col.) P.* Aér. (1890) 187-.  
 coefficient. *Le Dantec, —.* Les Mondes 52 (1880) 115-, 430-; 53 (1880) 28-.  
 —, *Hirn, G. A.* Les Mondes 53 (1880) 26-, 99-.  
 determination from Capt. Kater's experiments on pendulum. *Young, (Dr.) T.* QJ. Sc. 15 (1823) 351-.  
 to disk, calculation. *Touche, —.* Par. S. Mth. Bil. 25 (1897) 121-.  
 and elastic properties of thin cords, application of approximately sinusoidal oscillations of long period to. *Bouasse, H.* Toul. Fac. Sc. A. 11 (1897) F, 76 pp.  
 experiments. *Beaufoy, M.* Thomson A. Ph. 8 (1816) 94-.  
 —, *Touche, (le col.) —.* Aér. (1893) 11-.  
 to falling bodies. *Loomis, E.* Silliman J. 18 (1854) 67-.  
 and high speeds. *Lavergne, G.* Rv. Sc. 49 (1892) 811-.  
 —, —, (200-500 miles an hour). *Zahm, A. F.* J. H. Un. Cir. [17 (1897-98)] 60-.  
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- law. *Brenner*, —. *Grunert Arch.* 20 (1853) 260-; 34 (1860) 274-.
- *Otto*, *J. C. F. Z. Mth. Ps.* 11 (1866) 515-.
- *Vallier*, *E.* *Liouv. J. Mth.* 9 (1883) 147-.
- *Bashforth*, *F.* *Nt.* 33 (1886) 604-.
- *Espitallier*, —. *Isère S. Bll.* 25 (1887) 236-.
- *Rodrigues*, *J. M.* *Lisb. J. Sc. Mth.* 12 (1888) 26-.
- *Renard*, —. *Par. S. Ps. Sé.* (1889) 18-.
- *Vallier*, *E.* *C. R.* 119 (1894) 885-, 974.
- *Chapel*, *C.* *C. R.* 119 (1894) 997.
- demonstration by comparison of trajectories of projectiles. *D[arapsk]y*, —. *Dingler* 189 (1868) 373-.
- measurements. *Hélie*, —. *C. R.* 2 (1836) 619.
- *Redier*, *L.* *Aér.* 10 (1878) 71-.
- *Mannesmann*, *O.* *A. Ps. C.* 67 (1899) 105-.
- method. *Loessl*, *F. von.* *Aér.* (1894) 77-.
- method of study. *Dormenval*, *A.*, & *Côte*, *E.* *Aér.* (1893) 129-.
- to moving planes. *Proctor*, *R. A.* *Aër. S. Rp.* 6 (1871) 6-.
- surface. *Precht*, *J. J.* *Gilbert A.* 23 (1806) 129-.
- — *Faccioli*, *A.* (xii) *Rv. Sc.-Ind.* 9 (1877) 218-.
- — *Saint-Loup*, *L.* *C. R.* 88 (1879) 1257-; *Aér.* 11 (1879) 251-.
- plane, increase with lateral displacement. *Dupré*, *P.* *Aér.* (1892) 75-.
- —, oblique rectangular, attempt to find point where resultant acts. *Kummer*, *E. E.* *Berl. Ak. Ab.* (1876) (*Mth.*) 1-.
- projectiles. *Piton-Bressant*, —. *C. R.* 55 (1862) 357-.
- — *Melsens*, *H. L. F.* *C. R.* 93 (1881) 485-; *A. C.* 25 (1882) 389-.
- — *Siacci*, *E.* *Nap. Rd.* 34 (1895) 312.
- — *Emden*, *R.* *A. Ps. C.* 69 (1899) 454-.
- —, law. *Vieille*, *P.* *C. R.* 130 (1900) 235-.
- —, new method of determining. *Siacci*, *F.* [1877-78] *Tor. Ac. Sc. At.* 13 (1877) 131-; *Tor. Ac. Sc. Mm.* 31 (1879) 137-, 201-.
- —, rifled. *Longridge*, *J. A.* *R. S. P.* 16 (1868) 263-.
- —, —. *Merrifield*, *C. W.* *Phil. Trans.* 158 (1868) 443-.
- — with high velocities. *Didion*, *I.* *C. R.* 42 (1856) 1025-.
- relation to temperature. *Hirn*, *G. A.* [1881] *Brux. Ac. Mm.* 43 (1882) (No. 13) 91 pp.
- — (Hirn). *Faye*, *H. A. É.* *C. R.* 94 (1882) 377-.
- — velocity. *Clausen*, *T.* *As. Nr.* 5 (1827) 93-.
- to rifled shot. *Albenque*, *V.* *C. R.* 74 (1872) 852-.
- small velocities. *Braun*, *W.*, & *Kurz*, *A.* *Münch. Ak. Sb.* 11 (1881) 165-.
- various surfaces with varying velocities. *Hutton*, *C.* [1787] *Edinb. R. S. T.* 2 (1790) 29-.
- theory. *Samuelson*, *A.* *Civing.* 26 (1880) 521-.

## ELASTICITY.

(See also 0430.)

## 3200 General.

- Barruel*, *E.* *Par. Éc. Pol. J.* 11<sup>e</sup> cah. (1801-02) 295-.
- Tilloch*, *A.* *Tilloch Ph. Mg.* 22 (1805) 138-.
- Tyro (Pseud.)*. *Gleanings Sc.* 1 (1829) 87-.
- Masson*, *A.* *Par. S. Phlm. PV.* (1843) 85-.
- Wertheim*, *G.* *C.R.* 19 (1844) 229-; *A. C.* 12 (1844) 385-, 581-.
- Kupffer*, *A. T.* *Erman Arch. Rs.* 16 (1857) 400-.
- Besant*, *W. H.* *Mess. Mth.* 11 (1882) 63-.
- Beltrami*, *E.* *Palermo Cir. Mt. Rd.* 3 (1889) 67-.
- Axes*. *Pittaluga*, *G.* *Tor. Ac. Sc. At.* 14 (1878) 707-.
- Causes of elasticity. *Treschow*, *N.* *Kiöb. Dn. Vd. Selsk. Skr.* 4 (1805-06) 51-.
- Dilatancy of media composed of rigid particles in contact. *Reynolds*, *O.* *Ph. Mg.* 20 (1885) 469-.
- Elastic bodies and electricity, quaternion investigations. *Glan*, *P.* *Münch. Ak. Sb.* 28 (1899) 117-.
- — light, absorption, strong, of light by metals. *Glan*, *P.* *A. Ps. C.* 59 (1896) 401-.
- — —, of ultra violet light. *Glan*, *P.* *A. Ps. C.* 59 (1896) 131-, 155-.
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- —. *Steklov, V. A.* Kharkov Mth. S. Com. 3 (1893) 173-; Fsch. Mth. (1891) 1030.
- , similar. *Phillips, É.* [1869] Par. Ac. Sc. Mm. 38 (1873) 3-.
- sphere. *Jaerisch, P.* [1886] Hamb. Mth. Gs. Mt. 1 (1889) 155-.
- , homogeneous solid. *Seydler, A. J.* Prag Sb. (1882) 261-.
- tore. *Lecornu, L.* Par. Ec. Pol. J. 5 (1900) 79-.
- and vibrations. *Pagani, G. M.* Quetelet Cor. Mth. 6 (1830) 87-.
- of solids of revolution. *Jaerisch, P.* Crelle J. Mth. 104 (1889) 177-.
- Reflection of displacements. *Kretz, X. C. R.* 97 (1883) 476-.
- Rigidity of the earth. *Darwin, G. H. B. A.* Rp. (1882) 472-.
- —. *Rudski, M. P.* Ph. Mg. 33 (1894) 218-.
- —, Sir William Thomson's estimate. *Love, A. E. H.* Camb. Ph. S. T. 15 (1894) 107-.
- Rotating cylinders, circular long. *Chree, C.* Camb. Ph. S. P. 7 (1892) 283-.
- of elliptic section. *Chree, C.* Ph. Mg. 34 (1892) 70-, 154-.
- ellipsoid, problem (Chree). *Edwardes, D.* QJ. Mth. 27 (1895) 81-.
- spheroid. *Hough, S. S.* [1896] Phil. Trans. (A) 187 (1897) 319-.
- Similar bodies, forces and vibrations. *Galliot, —.* A. Pon. Chaus. 11 (1886) 490-.
- , motion. *Phillips, É.* Par. Ac. Sc. Mm. 38 (1873) 91-.
- Statistical problem. *Crelle, A. L.* Crelle J. 51 (1856) 100-.
- problems leading to Clapeyron's equations. *Müller-Breslau, H.* Z. Bauw. 41 (1891) 103-.
- Transmission of external forces through solids. *Leger, J. P. A.* Par. Ing. Civ. Mm. (1879) 288-.
- impact through solids. *Christoffel, E. B.* A. Mt. 8 (1877) 193-.
- motion through elastic media. *Poisson, S. D.* [1830] Par. Mm. Ac. Sc. 10 (1831) 549-.
- — — —. *Schmitt, N.* Hann. Archt.-Vr. Z. 45 (1899) 175-, 393-.
- , general theorem. *Hugoniot, —.* C. R. 102 (1886) 858-.
- —, especially in perfect gases. *Hugoniot, H.* Par. Ec. Pol. J. 57 (1887) 3-; 58 (1889) 1-.
- pressure through isotropic solid. *Boussinesq, J. C.* R. 93 (1881) 703-; 95 (1882) 1149-.
- strains in metals under stress. *Mengin, —.* C. R. 124 (1897) 681-.
- stress in isotropic media, and action at a distance. *Chree, C.* Edinb. Mth. S. P. 11 (1893) 107-.
- — — — solid, across plane of discontinuity. *Michell, J. H.* [1899] L. Mth. S. P. 31 (1900) 183-.

## VIBRATIONS.

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- Tendering, F.* Arch. Mth. Ps. 66 (1881) 147-.
- Volterra, V.* Rm. R. Ac. Linc. Rd. 2 (1893) (Sem. 1) 389-.
- Tedone, O.* Rm. R. Ac. Linc. Rd. 5 (1896) (Sem. 2) 58-.
- Amplitudes not infinitely small. *Braun, F.* [1873] (vii) Pogg. A. 151 (1874) 51-, 250-.
- Communication of vibrations. *Duhamel, J. M. C.* C. R. 15 (1842) 1-.
- —. *Peirce, B.* Am. As. P. 16 (1867) 17-.

- Composition of vibrations. *Maeh, E.* Wien SB. 47 (1863) (Ab. 2) 33-.
- Cylinders, infinite isotropic, small vibrations, velocity of transmission. *Pochhammer, L.* Crelle J. Mth. 81 (1876) 324-.
- , solid and hollow, longitudinal vibrations. *Chree, C.* [1898] L. Ps. S. P. 16 (1899) 304-; Ph. Mg. 47 (1899) 333-.
- Cylindrical shell, infinitely long, free vibrations. *Rayleigh, (Lord).* R. S. P. 45 (1889) 443-.
- , radical vibrations. *Basset, A. B.* [1889] L. Mth. S. P. 21 (1891) 53-.
- vessel containing liquid. *Rayleigh, (Lord).* Ph. Mg. 15 (1883) 385-.
- Damping in perfectly elastic media. *Podlaski, L.* Prace Mt.-Fiz. 9 (1898) 46-.
- Determination, experiments. *Felici, R. N.* Cim. 26 (\*1867) 255-.
- Disks, crystalline, transverse vibrations. *Sundberg, E.* Stockh. Öfv. (1885) No. 5, 77-; Föchr. Mth. (1885) 965.
- Elasticity and vibrations. *Barré de Saint-Venant, —.* L'I. 23 (1855) 440-.
- Engine foundations. *Whitcher, J.* Elect. Rv. 39 (1896) 68-, 102-.
- Equations. *O'Brien, M.* [1847] Camb. Ph. S. T. 8 (1849) 508-.
- in curvilinear coordinates. *Tedone, O.* Tor. Ac. Sc. At. 35 (1900) 302- or 460-.
- , general. *Stefan, J.* Pogg. A. 102 (1857) 365-.
- , integral. *Duhem, P.* Bordeaux S. Sc. Mm. 3 (1899) 317-.
- , —, for strings or rods. *Osorio, R. G.* Coimbra I. 3 (1855) 59-, 105-; 5 (1857) 213-.
- Forms. *Chree, C.* Edinb. Mth. S. P. 4 (1886) 65-.
- Free vibrations of structures, harmonic analysers for periods. *Reynolds, O.* Manch. Lt. Ph. S. Mm. & P. 4 (1891) 223-.
- Friction as cause. *Duhamel, J. M. C.* C. R. 42 (1856) 973-.
- General expressions for vibrations. *Somigliana, C.* Rm. R. Ac. Linc. Rd. 1 (1892) (Sem. 2) 111-.
- theory illustrated by earthquakes and earthquake sounds. *Knott, C. G.* Jap. Seism. S. T. 12 (1888) 115-.
- Infinite medium outside solid body. *Brillouin, M.* C. R. 117 (1893) 94-.
- Isochronous vibration, elementary solution of dynamical problem. *Reynolds, O.* [1882] Manch. Lt. Ph. S. P. 22 (1883) 38-.
- , —, — (Reynolds). *Rawson, R.* Manch. Lt. Ph. S. P. 22 (1883) 51-.
- Isotropic medium, general form of law. *Mercadier, E.* C. R. 115 (1892) 1264-.
- solids of nearly spherical form. *Chree, C.* Am. J. Mth. 16 (1894) 299-; 19 (1897) 121-.
- Lateral vibrations, period equation. *Greenhill, A. G.* Mess. Mth. 16 (1887) 115-.
- Light, differential equations. *Brill, A.* [1868] Mth. A. 1 (1869) 225-.
- Longitudinal vibrations of cylinders and prisms. *Peyré, J. M. M.* Seine-et-Oise Mm. (1835) 27-.
- Maintained vibrations. *Rayleigh, (Lord).* Ph. Mg. 15 (1883) 229-.
- Mutual action of oscillatory twists in elastic medium, application to vibratory theory of electricity. *Leahy, A. H.* [1885] Camb. Ph. S. T. 14 (1889) 188-.
- Pendulum observations, correction for elasticity. *Pizzetti, P.* N. Cim. 8 (1898) 215-.
- , —, —. *Almansi, E.* N. Cim. 9 (1899) 260-; 10 (1899) 85-, 305-.
- Plates, circular. *Résal, H.* A. Mines 2 (1872) 226-.
- , —. *Mercadier, E.* J. de Ps. 4 (1885) 541-.
- , clamped. *Lauricella, G.* N. Cim. 4 (1896) 134-.
- , infinite, free vibrations. *Rayleigh, (Lord).* L. Mth. S. P. 20 (1889) 225-.
- , —, propagation of transverse motion. *Boussinesq, J.* C. R. 108 (1889) 639-.
- and rods, experiments. *Baudrimont, A.* A. C. 32 (1851) 288-.
- Polyhedral concave surfaces. *Perry, G. C. R.* 76 (1873) 721-.
- Rings. *Love, A. E. H.* L. Mth. S. P. 24 (1893) 118-.
- , integration of equations. *Bulgakov, N.* Rs. Ps.-C. S. J. 31 (Ps.) (1899) 103-, 143-; Föchr. Ps. (1899) (Ab. 1) 477.

## RODS.

- Seebeck, A.* Leip. Ab. Mth. Ps. 1 (1852) 131-.
- longitudinal vibrations. *Stefan, J.* Wien SB. 55 (1867) (Ab. 2) 597-.
- , —. *Hugoniot, —, & Sébert, H.* C. R. 95 (1882) 213-, 278-, 338-, 381-, 775-.
- , —. *Chree, C.* QJ. Mth. 21 (1886) 287-; 23 (1889) 317-.
- , —. *Jäger, G.* Wien Ak. Sb. 109 (1900) (Ab. 2a) 81-.
- of isothermal bars. *Chree, C.* QJ. Mth. 24 (1890) 340-.
- rods, compound. *Obermann, J.* Arch. Mth. Ps. 55 (1873) 22-.
- and strings. *Chladni, E. F. F.* Voigt Mg. 1 (1797) 7-.
- wires, terminally loaded. *Navier, C. L. M. H.* Par. S. Phlm. Bil. (1823) 73-.
- thin elastic, and beams, motion. *Röhrs, J. H.* [1860] Camb. Ph. S. T. 10 (1864) 359-.
- , equilibrium and motion. *Kirchhoff, G.* Crelle J. 56 (1859) 285-.
- torsional vibrations. *Chladni, E. F. F.* Berl. Gs. Nt. Fr. N. Schr. 2 (1799) 274-.
- , —. *Cauchy, A. L.* Par. Mm. Ac. Sc. 9 (1830) 119-.
- , —. *Barré de Saint-Venant, —.* C. R. 28 (1849) 69-.
- , —. *Wertheim, G.* C. R. 28 (1849) 126-.
- transverse vibrations. *Stefan, J.* Wien SB. 32 (1858) 207-.
- (Stefan). *Lang, V. von.* Wien SB. 34 (1859) 63-.



- transverse vibrations, constants, determination.  
*Lang, V. von.* Pogg. A. 103 (1858) 624-.  
 —, equation. *Davidoglou, A.* Par. Éc. Norm. A. 17 (1900) 359-.  
 —, laws. *Mercadier, E.* C. R. 98 (1884) 803-, 911-; Par. S. Ps. Sé. (1884) 163-.  
 —, nodes. *Strehlke, F.* Pogg. A. 27 (1833) 505-; 28 (1833) 512-.  
 —, of rods of variable section. *Kirchhoff, G.* Berl. Ak. Mb. (1879) 815-.  
 —, — weighted rods. *Lippich, F.* [1861] Wien SB. 45 (Ab. 2) (1862) 91-.

Savart's law, proof. *Cauchy, A. L.* [1829] Par. Mm. Ac. Sc. 9 (1830) 117.

## SEISMIC PHENOMENA.

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- geometrical theory. *Kövesigethy, R.* Mth. Term. Éts. 13 (1895) 363-; Mth. Nt. B. Ung. 13 (1897) 418-; Föl. Közl. 30 (1900) 23-, 120-.  
 mathematical theory. *Chree, C.* [1896] L. Ps. S. P. 15 (1897) 31-; Ph. Mg. 43 (1897) 173-.  
 propagation of earthquake motion. *Oldham, R. D.* Phil. Trans. (A) 194 (1900) 135-.  
 —, —, velocity. *Fouqué, F., & Michel-Lévy, —.* Rv. Sc. 41 (1888) 97-, 161-.  
 —, —, —, apparent. *Rudzki, M. P.* [1897] Krk. Ak. (Mt.-Prz.) Rz. 13 (1898) 348-; Btr. Geops. 3 (1898) 495-.  
 shocks. *Le Conte, J.* Science 6 (1885) 540.  
 waves, phenomena analogous to dispersion of light. *Rudzki, M. P.* [1898] Krk. Ak. (Mt.-Prz.) Rz. 16 (1899) 115-; Crc. Ac. Sc. Bll. (1898) 166-.  
 —, velocity, Brescian earthquake, Nov. 1894. *Baratta, M.* Nt. 53 (1895-96) 564.  
 —, —, Constantinople earthquake. *Eginitis, —.* Nt. 54 (1896) 447.  
 —, —, and elastic constants of rocks. *Nagoka, H.* Ph. Mg. 50 (1900) 53-.

- Shells bounded by confocal spheroids, free normal vibrations. *Ibbetson, W. J.* Camb. Ph. S. P. 5 (1886) 68-, 312-.  
 —, rotating ellipsoidal, containing fluid. *Hough, S. S.* [1895] Phil. Trans. (A) 186 (1896) 469-.  
 Small body fastened to elastic body. *Dienger, J.* Grunert Arch. 8 (1846) 205-.  
 — vibrations, integration of partial differential equations. *Ostrogradsky, M. A.* [1829-32] St. Pét. Ac. Sc. Mm. 1 (1831) 455-; 2 (1833) 339-.  
 —, — of surface. *Civinini, L.* G. Mt. 28 (1890) 375-.  
 Solids. *Heim, J. P. G. von.* [1849] Crelle J. 40 (1850) 1-.  
 —. *Lauricella, G.* A. Mt. 26 (1897) 113-.  
 —, isotropic. *Cerruti, V.* Rm. R. Ac. Linc. Mm. 8 (1880) 361-; 13 (1882) 123.  
 —, —. *Volterra, V.* Acta Mth. 18 (1894) 161-.  
 —, —. *Lauricella, G.* Catania Ac. Gioen. At. 13 (1899) Mem. 2, 9 pp.

- Solids, isotropic and homogeneous. *Tedone, O.* Tor. Ac. Sc. Mm. 47 (1897) 181-.  
 Spheres. *Mainardi, G.* A. Sc. Lomb. Ven. 8 (1838) 122-.  
 —. *Lamb, H.* L. Mth. S. P. 13 (1881-82) 189-.  
 —. *Jaerisch, P.* Hamb. Mth. Gs. Mt. 3 (1900) 51-.  
 —, hollow, frequency of oscillation. *Loschmidt, J.* Wien Ak. Sb. 93 (1886) (Ab. 2) 434-.  
 —, isotropic. *Henneberg, L.* [1877] A. Mt. 9 (1878-79) 193-.  
 —. *Jaerisch, P.* [1879] Crelle J. Mth. 88 (1880) 131-.  
 —, motion in infinite elastic medium, and reaction of medium on spheres, theory. *Brillouin, —.* A. C. 2 (1894) 117-.  
 — and spherical shells, isotropic, forced vibrations. *Chree, C.* Camb. Ph. S. T. 16 (1898) 14-.  
 —, tides. *Darwin, G. H.* Mess. Mth. 8 (1879) 23-.  
 Spherical shells. *Lamb, H.* [1882] L. Mth. S. P. 14 (1882-83) 50-.  
 — containing liquid, free and forced vibrations. *Love, A. E. H.* L. Mth. S. P. 19 (1889) 170-.  
 Spheroid, viscous, and yielding nucleus, tides. *Darwin, G. H.* Phil. Trans. 170 (1879) 1-.  
 Springs, spiral, loaded. *Wülfen, L. R.* Ph. Mg. 38 (1894) 386-.  
 —, —, longitudinal vibrations, character. *Geršić, A.* Rs. Ps.-C. S. J. 31 (Ps.) (1899) 249-; Fsch. Ps. (1899) (Ab. 1) 490.  
 —, —, propagation of gradual stretching. *La Rive, L. de.* Arch. Sc. Ps. Nt. 6 (1898) 380-.  
 —, uniform straight. *Sang, E.* [1867] Edinb. R. S. P. 6 (1869) 150-.

## STRINGS.

- approximately sinusoidal oscillations of long period, applications to resistance of air and elastic properties of thin cords. *Bouasse, H.* Toul. Fac. Sc. A. 11 (1897) F, 76 pp.  
 elastic, motion. *M.* QJ. Mth. 4 (1861) 178-.  
 —, suspended at one end and cut at any point, motion. *Niven, C.* [1878] Mess. Mth. 8 (1879) 75-.  
 —, —, —, motion. *Mercadier, E. de.* C. R. 77 (1873) 639-, 671-, 1292-, 1366-.  
 —, —, —, — (Mercadier). *Valérius, H.* C. R. 77 (1873) 1184-.  
 experiments. *Melde, F.* A. Ps. C. 21 (1884) 452-.  
 indiarubber, longitudinal vibrations. *Lang, V. von.* Wien Ak. Sb. 108 (1899) (Ab. 2a) 692-.  
 —, stretched, forced longitudinal and transverse vibrations, phase differences. *Oosting, H. J.* Amst. Ak. Vs. 3 (1895) 262-; Fsch. Ps. (1895) (Ab. 1) 425.  
 —, —, vibrations, stroboscopic experiments. *Oosting, H. J.* Amst. Ak. Vs. 4 (1896) 152-; Fsch. Ps. (1895) (Ab. 1) 425.

- indiarubber, stretched, transverse vibrations, frequency. *Baker, T. J.* [1900] L. Ps. S. P. 17 (1901) 107-; Ph. Mg. 49 (1900) 347-.
- periodically loaded, discontinuities connected with propagation of wave-motion. *Godfrey, C.* Ph. Mg. 45 (1898) 356-.
- stretched. *Harnack, A.* Mth. A. 29 (1887) 486-.
- , wave-motion. *Barlow, W. B. A.* Rp. (1894) 593.
- and strips. *Gripon, E. C. R.* 73 (1871) 1213-; Par. Ec. Norm. A. 2 (1873) 357-.
- vibrating, elasticity and change of volume. *Cagniard-Latour, C.* Edinb. J. Sc. 8 (1828) 201-.
- , —, influence. *Savart, N. A. C.* 6 (1842) 5-; C. R. 14 (1842) 915-.

- Systems, approximately simple. *Rayleigh, (Lord).* Ph. Mg. 46 (1873) 357-; 48 (1874) 258-.
- , compound. *Chree, C.* Camb. Ph. S. T. 15 (1894) 139-.
- of particles, reflection and refraction in. *Cauchy, A. L.* C. R. 8 (1839) 985-; 9 (1839) 1-, 59-, 91-.
- points. *Duhamel, J. M. C.* [1832] Par. Ec. Pol. J. 23<sup>e</sup> cah. (1834) 1-.
- —, properties of vibrations. *Stefan, J.* Wien Sb. 66 (1872) (Ab. 2) 159-.
- Transverse vibrations of strips, laws. *Mercadier, E.* Lum. Élect. 12 (1884) 81-.
- Vis viva*, determination, new theorem. *Saint-Venant, B. de.* C. R. 60 (1865) 732-.
- , equation. *Oppenheim, S. A.* Ps. C. 14 (1881) 705-.

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- case. *Halphen, G. H.* C. R. 98 (1884) 422-.
- of elastic displacement, propagation along helical wire. *Love, A. E. H.* Camb. Ph. S. T. 18 (1900) 364-.
- explosive, propagation in solids and liquids. *Berthelot, —.* C. R. 112 (1891) 16-.
- form, in rocks. *Rudzki, M. P.* [1897-99] Krk. Ak. (Mt.-Prz.) Rz. 13 (1898) 377-; 19 [20] (1902) 143-; Btr. Geops. 3 (1898) 519-; Crc. Ac. Sc. Bll. (1899) 373-.
- influence of gravity, and case of elastic globe. *Bromwich, T. J. P. A.* [1898] L. Mth. S. P. 30 (1899) 98-.
- plane, general theory. *Beltrami, E.* Palermo Cir. Mt. Rd. 5 (1891) 227-.
- , in incompressible medium, and double refraction. *Kohl, E.* Mh. Mth. Ps. 10 (1899) 343-.
- , of 3rd order in isotropic elastic medium. *Pearson, K.* Camb. Ph. S. P. 5 (1886) 296-.
- , propagation. *Haughton, S.* Camb. and Dubl. Mth. J. 8 (1853) 159-; 9 (1854) 129-.
- transverse, in elastic bodies. *Glan, P.* Wien Ak. Sb. 107 (1898) (Ab. 2a) 1050-.
- propagation. *Mathieu, É.* C. R. 56 (1863) 255-.
- in absorbent media and seismological application. *Kohl, E.* Mh. Mth. Ps. 9 (1898) 358-.

- propagation due to internal forces, transformation of equations. *Warren, J. W.* QJ. Mth. 6 (1863) 137-.
- in elastic media, method of determining velocities. *Emtage, W. T. A.* Ph. Mg. 31 (1891) 464-.
- along plane surface of elastic solid. *Rayleigh, (Lord).* L. Mth. S. P. 17 (1887) 4-.
- in variable medium, and seismological applications. *Kohl, E.* Mh. Mth. Ps. 9 (1898) 151-.
- reflexion and refraction, with seismological applications. *Knott, C. G.* Ph. Mg. 48 (1899) 64-.
- solitary plane, reflexion and refraction. *Kelvin, (Lord).* Edinb. R. S. P. 22 (1900) 366-.
- , spherical, in elastic solid, force necessary for production. *Kelvin, (Lord).* Ph. Mg. 47 (1899) 480-; 48 (1899) 227-, 388-.
- transverse spherical, reflexion and refraction. *Jaerisch, P.* Crelle J. Mth. 117 (1897) 291-.
- types, 2, graphical. *Kelvin, (Lord).* B. A. Rp. (1898) 792.

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- period and logarithmic decrement. *Thompson, J. O.* Ps. Rv. 8 (1899) 141-.
- — — (Thompson). *Peddie, W.* Edinb. R. S. P. 22 (1900) 598-.
- straight, curves produced by vibrations. *Sang, E.* [1889] Sc. S. Arts T. 12 (1891) 295-.
- torsional vibrations. *Peddie, W.* [1893-98] Ph. Mg. 38 (1894) 36-; Edinb. R. S. T. 38 (1897) 611-; 39 (1900) 425-.
- , damping. *Streintz, H.* Wien Ak. Sb. 69 (1874) (Ab. 2) 337-; A. Ps. C. 153 (1874) 387-.
- , — (Streintz). *Meyer, O. E.* A. Ps. C. 154 (1875) 354-.
- , — (Meyer). *Streintz, H.* A. Ps. C. 155 (1875) 588-.
- , —. *Braun, W., & Kurz, A.* Carl Rpm. 15 (1879) 561-; 17 (1881) 233-.
- , —. *Koch, A.* A. Ps. C. 36 (1889) 122-.
- , — due to internal friction. *Klemenčič, I.* Wien Ak. Sb. 81 (1880) (Ab. 2) 791-.
- of heated iron wire. *Messer, H.* [1878] Freiburg B. 7 (1880) 260.
- traversed by continuous current. *Hurmuzescu, D.* C. R. 113 (1891) 125-.

## 3230 Torsion and flexure of prisms.

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- Barré de Saint-Venant, —.* Par. Mm. Sav. Étr. 14 (1856) 233-.
- Combined flexure and torsion. *Kurz, A.* Exner Rpm. 25 (1889) 64-.

## CYLINDERS.

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- with circular base. *Thomae, J.* *Leip. Mth. Ps.* B. 38 (1886) 186-.
- —, flexure. *Pochhammer, L.* *Crelle J. Mth.* 81 (1876) 33-.
- —, —. *Ribière, —.* *C. R.* 128 (1899) 86-.
- elastic relations. *Voigt, W.* *Gött. Nr.* (1886) 505-.
- elliptic, torsion. *Eecen, A.* *Arch. Néerl.* 10 (1875) 324-.
- metallic, resistance. *Deslandres, H.* *A. Pon. Chauss.* 5 (1893) 1160-.
- resisting flexure, equilibrium. *Sayno, A.* *Mil. I. Lomb. Rd.* 24 (1891) 1131-; 25 (1892) 147-.
- rotating, tension. *Grübler, M.* *D. Nf. Vh.* (1889) (*Th.* 2, *Hälfte* 1) 73-.
- stress and strain. *Fuchs, F.* *Leip. Mth. Ps.* B. 26 (1874) 56-.

External forces of beams, estimation. *Szűts, M.* [1895] *Mth. Termt. Éts.* 14 (1896) 85-.

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- Heim, J. P. G. von.* *Crelle J.* 37 (1848) 305-.
- Barré de Saint-Venant, —.* *C. R.* 39 (1854) 1027-; *Liouv. J. Mth.* 1 (1856) 89-.
- Wiedemann, G.* *Pogg. A.* 107 (1859) 439-.
- Vidal, V.* *Cuyper Rv. Un.* 17 (1865) 1-.
- Burr, W. H.* *Am. J. Mth.* 2 (1879) 13-, 191.
- Réal, H.* *C. R.* 102 (1886) 658-.
- (*Réal.*) *Boussinesq, J.* *C. R.* 102 (1886) 797-.
- Apparatus for experiments with beams. *Greenleaf, J. L.* *Franklin I. J.* 140 (1895) 27-.
- Bars. Airy, G. B.* *As. S. Mm.* 15 (1846) 157-.
- , *Hoppe, R.* [1857] *Pogg. A.* 102 (1857) 227-; (vi *Adds.*) *Berl. Pol. Gs. Vh.* 19 (1859) 161-.
- , change of form. *Peschka, G. A. V. Z.* *Mth. Ps.* 13 (1868) 38-.
- , thin (*Kater*). *Sang, E.* *Edinb. N. Ph. J.* 30 (1841) 321-.
- Beams. *Padula, F.* *Nap. Rd.* 1 (1842) 103 [203]-.
- , deflection. *Cox, H.* [1850] *Camb. Ph. S.* T. 9 (1856) 177-.
- , experiments. *Eddy, H. T.* *V. Nost. Eng. Mg.* 11 (1874) 248-.
- fixed at ends, strength. *Cooper, T.* *Franklin I. J.* 41 (1861) 195-.
- — —, transverse strength. *Rebhann, G.* *Förster Al. Bauztg.* 18 (1853) 130-.
- under flexure, diagrams of equivalents of pressure. *Heinzerling, F.* *Förster Al. Bauztg.* 42 (1877) 9-.

- Beams under flexure, principal lines, use in calculation of metallic arches. *Chaudy, F.* *Gén. Civ.* 14 (1888-89) 169-.
- lying freely, influence of rough edges on resistance. *Heyn, R.* *Civing.* 29 (1883) 333-.
- in one plane, formulæ. *Nicour, C.* [1884] *Gén. Civ.* 6 (1884-85) 142-.
- with scarfed ends. *Villareal, F.* *Arg. S. Ci. A.* 47 (1899) 104-.
- , transverse strength. *Barlow, W. H.* *Phil. Trans.* (1855) 225-; (1857) 463-.
- —, *Hänel, A.* *Hann. Z. Archt. Vr.* 7 (1861) 137-.
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- Elasticity of solids, measurement according to their different dimensions. *Weber, W. E.* Pogg. A. 28 (1833) 324-.
- and strength of materials, determination, application of electricity. *Codazza, G.* II Polit. 1 (1866) (Tech.) 206-.
- Extensibility of elastic solids, measurement, instrument for. *Forbes, J. D.* Edinb. R. S. P. 2 (1851) 172-; Ph. Mg. 35 (1849) 92-.
- Extensometer, reflecting, description and theory. *Knibbs, G. H.* N. S. W. R. S. J. 31 (1897) 94-.
- Fleximeter and its applications. *Guidi, C.* Tor. Ac. Sc. At. 35 (1900) 101- or 175-.
- — — alone or with extensometer. *Fränkel, W.* Civing. 30 (1884) 465-, 575.
- Flexure, resistance to, determination. *Wiebe, F. K. H.* Berl. Pol. Gs. Vh. 18 (1857) 134-.
- of soft bodies, investigation by interference bands. *Segel, —.* [1899] Ps. Z. 1 (1900) 126-.
- Gases, elasticity, new method of investigation. *Kraevich, K. D.* (xii) Rs. Ps.-C. S. J. 14 (Ps.) (1882) [(Pt. 1)] 395-.
- Hydraulic materials, testing methods. *Le Chatelier, H.* [1893] A. Mines 4 (1893) 252-, 367-; Am. I. Mn. E. T. 22 (1894) 3-, 775.
- Hydrostatic pressure, tests by. *Wiegand, S. L.* Franklin I. J. 118 (1884) 116-.
- Iron, apparatus for direct measurement of expansion and contraction. *Dupuy, C. A.* Pon. Chaus. 14 (1877) 381-.
- Iron bridges, experimental investigation, methods. *Habut, —.* A. Pon. Chaus. 12 (1896) 374-.
- — — stresses in, instrument for testing. *Balcke, M.* Dingler 293 (1894) 175-.
- and steel, apparatus for various tests. *Warren, W. H.* Aust. As. Rp. (1891) 433-.
- — — strain measurements by thermoelectric couple. *Turner, —.* Gén. Civ. 32 (1897-98) 413-.
- — — testing, commercial methods. *Kreuzpointner, P.* Franklin I. J. 145 (1898) 401-.
- — — and standards in America. *Colby, A. L.* I. & S. I. J. (1900) (No. 2) 215-.
- Mechanical testing of materials. *Peet, W. G.* I. ME. P. (1898) 670-.
- Metals, flexure, recorder. *Frémont, C. C. R.* 124 (1897) 398-.
- , portable recorder for tests. *Henning, G. C. I. & S. I. J.* (1897) (No. 2) 155-.
- , "schiséophone," testing apparatus for structure of metallic masses. *Place, (le capit.) — de.* C. R. 115 (1892) 582-.
- , test pieces for bars and plates, adoption of standard forms. *Hackney, W. I. CÉ. P.* 76 (1884) 70-.
- — — calculations of elongation. *Rekceb, D.* Rv. Sc. 51 (1893) 476-.
- , testing. *Laverne, G.* Rv. Sc. 52 (1893) 46-.
- , apparatus. *Frémont, C.* Par. Ing. Civ. Mm. (1898) (Pt. 3) 506-.
- — — methods, etc. *Zernov, D.* Mosc. Un. Mm. (Ps.-Mth.) 10 (1893) 20 pp.
- , methods. *Frémont, C.* C. R. 125 (1897) 492-; Par. Ing. Civ. Mm. (1897) (Pt. 2) 671-, 689-.
- New method. *Cantone, M.* Rm. R. Ac. Linc. Rd. 4 (1888) (Sem. 1) 220-, 292-.
- Optical study of elasticity of solids. *Cornu, A.* [1869-79] C. R. 69 (1869) 333-; R. I. P. 9 (1882) 191-.
- — — — (Cornu's method). *Wulf, G.* Fsch. Ps. (1894) (Ab. 2) 86-.
- — — — methods. *Cornu, A.* Arch. Néerl. 5 (1900) 322-, 679.
- — — flexure, apparatus for. *Lewy, M., & Tresca, H. E.* C. R. 95 (1882) 1114-.
- Physical tests, improvements in methods. *Abbott, A. V.* Am. I. Mn. E. T. 12 (1884) 607-.
- Road metal, testing methods. *Reid, H. F.* Maryland Gl. Sv. 3 (1899) 315-.
- Standardising of tests. *Hartig, —.* Civing. 33 (1887) 395-.
- — — — *Durant, L.* Par. Ing. Civ. Mm. (1891) (Pt. 1) 219-.
- — — — *Warren, W. H.* N. S. W. R. S. J. 31 (1897) xiii (bis)-.
- Steam boilers, standard method of testing. *Amer. Soc. Mech. Eng. Comm.* V. Nost. Eng. Mg. 32 (1885) 211-, 308-.
- Steel, structural, method of testing. *Hunt, A. E.* Am. S. CE. T. 30 (1893) 181-, 666-.
- Strains, indicator for use at sea. *Stromeyer, C. E.* Nv. Archt. T. 27 (1886) 33-.



- Strains, and internal stress, determination by polariscope. *Alexander, P.* Glasg. Ph. S. P. 28 (1887) 242-.
- , measurement, taseometer for. *Steiner, F.* Dingler 226 (1877) 283-.
- , small, measurement. *Ewing, J. A. R. S.* P. 58 (1895) 123-.
- , —, apparatus. *Ewing, J. A.* Nt. 50 (1894) 408.
- , —, —, *Warren, W. H. N. S. W. R.* S. J. 31 (1897) 89-.
- , —, —, for bars subjected to twist. *Coker, E. G.* Ph. Mg. 46 (1898) 520-.
- Tensile tests, apparatus. *O'Neill, C.* [1863] Manch. Ph. S. Mm. 2 (1865) 389-.
- , —, self-recording. *Leuner, O.* Dingler 270 (1888) 165-.
- , —, —, *Tetzner, H.* Civing. 37 (1891) 503-.
- , —, —, *Guidi, C.* Tor. Ac. Sc. At. 34 (1898) 39-.
- , factors influencing results. *Goedicke, E.* Oestr. Z. Brgw. 31 (1883) 557-, 575-.
- of metals and fibres, smicrolometer for. *Lydiatt, E.* Nicholson J. 32 (1812) 81-.
- — silks, instrument for. *Bolle, G.* Trieste Bll. 7 (1882) 248-.
- — wool, instrument for. *Karmarsch, K.* Wien Jb. Pol. I. 4 (1823) 347-.

*Testing Machines.*

- Conti, P.* Bologna Ac. Sc. Mm. 7 (1876) 223-.
- for chain cables and timber. *Dunn, T.* (vi Addrs.) CE. I. P. 16 (1856-57) 301-.
- Emery's, Towne, H. R. I. M.E. P.* (1888) 206-.
- for equal alternate stresses. *Warren, W. H. N. S. W. R. S. J.* 32 (1898) exix-.
- history, construction and use. *Abbott, A. V.* V. Nost. Eng. Mg. 30 (1884) 204-, 325-, 382-, 477-.
- horizontal lever. *Adamson, D. I. & S. I. J.* (1888) (No. 2) 12-.
- hydraulic. *Tuit, J. E.* Br. Archt. J. 3 (1896) 352-.
- for impact tests. *Russell, S. B.* Am. S. CE. T. 39 (1898) 237-.
- improvements. *Abbott, A. V.* Science 3 (1884) 312-, 814.
- for metals. *Thureau, G.* [1887] Gén. Civ. 12 (1887-88) 5-, 21-.
- , hydraulic system for tensile and other tests. *Foris, —.* Gén. Civ. 19 (1891) 25-.
- , *Kennedy's, Combe, J.* [1890] Gén. Civ. 18 (1890-91) 81-.
- six hundred ton machine at Athens, Pa. *Macdonald, C.* Am. S. CE. T. 16 (1887) 1-.
- springs, standardising of loading. *Pfuhl, E.* Civing. 35 (1889) 371-.
- , use in rigidity experiments. *Strack, —.* [1886] Karlsruhe Nt. Vr. Vh. 10 (1888) (S.) 104-.
- Taylor's, for vegetable fibres, threads and twine. *Taylor, T.* U. S. Sec. Ag. Rp. (1891) 414-.

- Thomasset's, Gautier, F. I. & S. I. J.* (1889) (No. 1) 184-.
- U. S. A. machine at Watertown arsenal. *Holley, A. L.* Am. I. Mn. E. T. 7 (\*1879) 256-.
- Timber, strength, microscopic investigation. *Day, F. M.* Am. Ph. S. P. 21 (1884) 333-.
- , uniform system of testing, need. *Campbell, F. A.* [1886] Vict. R. S. T. 23 (1887) 244-.
- Wires, apparatus for measurement and demonstration of deformation. *Oberbeck, A. N.* Vorp. Mt. 19 (1888) 86-.
- , extension, apparatus for measurement. *Searle, G. F. C.* Camb. Ph. S. P. 10 (1900) 318-.
- under stress, temperature changes in, testing apparatus. *Wassmuth, A.* Wien Ak. Sb. 97 (1889) (Ab. 2a) 52-.
- , telegraph, mechanical testing. *Culley, R. S.* (ix) Tel. E. J. 2 (1873) 211-.
- , —, apparatus for. *Rothen, T. J.* Tel. 4 (1878-80) 697-.

- Minerals, dense, constants of some. *Voigt, W., & Drude, P.* Gött. Nr. (1889) 519-; (1890) 542-.
- , —, —, *Drude, P., & Voigt, W.* A. Ps. C. 42 (1891) 537-.

## MODULI OF ELASTICITY.

- determination by flexure of bars. *Koch, K. R.* A. Ps. C. 5 (1878) 251-.
- — —, *Pscheidl, W.* Wien Ak. Sb. 79 (1879) (Ab. 2) 114-; 86 (1883) (Ab. 2) 115-.
- , new method. *König, A.* Berl. Ps. Gs. Vh. (1885) 59-.
- , 's Gravesande's method. *Oberbeck, A. A.* Ps. C. 37 (1889) 526.
- , —, *Stradling, G.* A. Ps. C. 41 (1890) 330-.
- for small loads. *Weston, C. P.* Ps. Rv. 8 (1899) 297-.
- — quantities of material, and some high moduli. *Auerbach, F.* A. Ps. C. 58 (1896) 381-.
- by tension experiments. *Briz, A. F. W.* Grunert Arch. 4 (1844) 239-.
- theory of balance spring. *Phillips, E.* C. R. 56 (1863) 296-; 58 (1864) 449-; A Mines 15 (1869) 65-.
- vibrations. *Kurz, A.* Exner Rpm. 19 (1883) 246-.
- and elastic limit, determination. *Phillips, E.* C. R. 88 (1879) 315-.
- Hooke's law, apparent exceptions to. *Brillouin, M. A. C.* 13 (1898) 231-.
- and moduli of resistance. *Winkler, E.* Civing. 9 (1863) 405-.
- new constant, definition and determination, and correction of modulus. *Tammen, H. G.* (xii) Zwick. Vr. Nt. Jbr. (1880) 21-.

- primary and secondary longitudinal moduli and thermal constants of latter. *Miller, A.* Münch. Ak. Ab. 15 (1886) 705-.
- of rod as function of strain. *Hartig, E.* Civing. 39 (1893) 113-.
- temperature, effect on modulus. *Mayer, A. M.* [1894] Am. J. Sc. 1 (1896) 81-, 250.
- , —, —, particularly of metals. *Kupffer, A. T.* [1852-56] St. Pét. Ac. Sc. Mm. 8 (1857) 397-; St. Pét. Ac. Sc. Bll. 14 (1856) 273-, 289-.
- and of thermal capacity, and other physical constants, relations. *Tomlinson, H. R. S.* P. 38 (1885) 488-.
- thermal and elastic phenomena, relations. *Mil, E.* Mil. I. Lomb. Rd. 24 (1891) 1050-.
- , —, —, —. *Alibrandi, P. G.* Mt. 38 (1900) 77-.
- expansion and extensibility of wires and caoutchouc, relations. *Kurz, A.* Exner Rpm. 22 (1886) 547-; 27 (1891) 631-.
- , —, temperature and torsion modulus, relations. *Sayno, A.* Mil. I. Lomb. Rd. 24 (1891) 293-, 574-.
- and vibrations as function of molecular weights and specific heat. *Foerster, O.* Z. Mth. Ps. 41 (1896) 258-.
- Young's, determination, principles. *Miller, A.* Münch. Ak. Ab. 16 (1888) 569-.
- , influence of magnetisation. *Tangl, K.* [1900] Mth. Termnt. Éts. 18 (1900) 49-; Mth. Nt. B. Ung. 18 (1903) 7-.
- , —, —, heat and electric current. *Noyes, M. C.* Ps. Rv. 3 (1896) 432-.

- Poisson's ratio. *Poisson, S. D.* A. C. 36 (1827) 384-.
- , —. *Schneebeli, H.* Zür. Vjschr. 14 (1869) 375-.
- , —. *Mallock, A. R. S. P.* 29 (1879) 157-.
- , —. *Kayser, E.* [1887] Danzig Schr. 7 (1888-91) (Heft 1) xiii-.
- , — and Lamé's formulæ, experimental verification. *Amagat, E. H.* C. R. 106 (1888) 479-.
- , — for prisms. *Bauschinger, J.* Civing. 25 (1879) 81-.
- , — at various temperatures. *Dahlander, G. R.* Stockh. Öfv. (1886) 213-; Fsch. Ps. (1886) (Abt. 1) 470-.
- Resilience. *Tredgold, T.* Tilloch Ph. Mg. 51 (1818) 276-.
- Rigidity. *Gerstner, F. A. von.* Pogg. A. 26 (1832) 269-.
- , —. *Göllner, H.* Dingler 273 (1889) 205-.
- , torsion and flexure, experiments. *Everett, J. D.* Phil. Trans. 157 (\*1867) 139-; 158 (1868) 363-; B. A. Rp. 38 (1868) (Sect.) 8.
- Slate, flexural strength, determination. *Gamba, P. N.* Cim. 10 (1899) 168-.
- Solids, elastic constants. *Saint-Venant, A. J. C. B. de.* C. R. 86 (1878) 781-.
- , —, —. *Amagat, E. H.* C. R. 108 (1889) 1199-.

- Solids, elasticity and strength. *Weisbach, J.* Civing. 9 (1863) 283-.
- , isotropic, effect of heat on modulus. *Borchardt, C. W.* Berl. Mb. (1873) 9-.
- , —, relations between elastic constants. *Voigt, W.* A. Ps. C. 38 (1889) 573-.

# THREADS AND FIBRES.

- Glass, spun, tenacity. *Gibson, E., & Gregory, R. A. L.* Ps. S. P. 8 (1887) 191-; Ph. Mg. 23 (1887) 351-.
- threads, elasticity, and torsion-balances. *Ritchie, W.* Phil. Trans. (1830) 215-.
- , —, flexural rigidity. *Hartig, —.* Civing. 38 (1892) 265-.
- Quartz threads, absolute rigidity coefficient. *Barnett, S. J.* Ps. Rv. 6 (1898) 114-.
- , —, elastic constants. *Threlfall, R.* Aust. As. Rp. (1890) 363-; Ph. Mg. 30 (1890) 99-.
- , —, — (Threlfall). *Boys, C. V.* Ph. Mg. 30 (1890) 116-.
- Silk fibres, elasticity. *Quajat, E.* St. Sp. Ag. It. 15 (1888) 739-.
- , —, —. *Kurz, A.* Exner Rpm. 27 (1891) 409-.
- , — and threads, properties, relation. *Quajat, E.* St. Sp. Ag. It. 15 (1888) 738-.
- threads, elasticity. *Weber, W. E.* [1835] Gött. Cm. 8 (1832-37) (Ps.) 45-; Pogg. A. 34 (1835) 247-.
- Spider lines, elasticity. *Gray, J. H.* Ph. Mg. 37 (1894) 491-.
- Very fine threads, properties and uses. *Boys, C. V.* L. Ps. S. P. 9 (1888) 8-; Ph. Mg. 23 (1887) 489-.
- Wool, physical properties. *Chudzinsky, W.* Lndw. V.-St. 33 (1887) 11-.

# TORSION.

(See also 3220 Vibrations and 3630.)

- Segnitz, E.* [1851] Crelle J. 43 (1852) 340-.
- Warburg, E.* [1879] Freiburg B. 7 (1880) 444-.
- Wiedemann, G. H.* A. Ps. C. 6 (1879) 485-; 7 (1879) 496.
- Baumeister, M.* [1882] A. Ps. C. 18 (1883) 578-.
- Bouasse, H.* Toul. Fac. Sc. A. 12 (1898) A, 29 pp.
- Schulz, B.* Hann. Archt.-Vr. Z. 45 (1899) 201-, 569-.
- Fibrous bands, torsional elasticity. *Hartig, G.* Civing. 36 (1890) 359-.
- Influence of after-strain and permanent set on measurements. *Negbauer, W.* A. Ps. C. 44 (1891) 759-.
- , — traction. *Cantone, M., & Michelucci, E.* Rm. R. Ac. Linc. Rd. 6 (1897) (Sem. 2) 191-.
- Iron and steel, experiments with. *Pérard, L.* Brux. Ac. Bll. 42 (1876) 894-; Cuyper Rv. Un. 6 (1879) 198-, 397-, 407-; 7 (1880) 486-.
- , —, —, torsional constants. *Peddie, W.* [1900] Edinb. R. S. P. 23 (1902) 16.

- Method of investigation. *Melde, F. E.* (xn) Z. Instk. 1 (1881) 76-.
- Modulus. *Bevan, B.* [1828] Phil. Trans. (1829) 127-.
- , determination for rotating shafts, application of telephone to. *Resio, C. C. R.* 90 (1880) 604-.
- , —, —, —, indicator for. *Resio, C. Lum.* Elect. 20 (1886) 433-.
- , —, —, or spiral springs, ergometer for. *Jervis-Smith, F. J.* Ph. Mg. 45 (1898) 183-; 46 (1898) 848.
- , —, —, —, —, — (Jervis-Smith). *Lanza, G.* Ph. Mg. 46 (1898) 260.
- , — by self-recording apparatus. *Thurston, R. H.* (xn) Franklin I. J. 65 (1873) 254-.
- of homogeneous isotropic solid at given temperature. *Sayno, A.* Mil. I. Lomb. Rd. 24 (1891) 190-.
- Timber, experiments with. *Bouineau, —.* Par. A. Pon. Chaus. 1 (1861) 101-.
- Vibrations, period, measurement. *Wood, R. W.* A. Ps. C. 56 (1895) 171-.
- , sources of error in experiments. *Tomlinson, H. L.* Ps. S. P. 8 (1887) 90-; Ph. Mg. 22 (1886) 414-.
- Wires, modulus, and definition of "softness." *Bouasse, H. C. R.* 126 (1898) 466-; A. C. 14 (1898) 98-.
- , — of oscillating wire. *Berson, G., & Bouasse, H. C. R.* 119 (1894) 48-.
- , permanent torsion, change due to change of temperature. *Bosquet, R. H. M. L.* Ps. S. P. 9 (1888) 49-; Ph. Mg. 24 (1887) 160-.
- , —, —, —, —, —. *Tomlinson, H. L.* Ps. S. P. 9 (1889) 67-; Ph. Mg. 24 (1887) 253-.
- , specific resistance, dependence on tension. *Benton, J. R.* A. Ps. 3 (1900) 471-.
- , temperature, effect on modulus. *Baille, —.* As. Fr. C. R. (1884) (Pt. 1) 158.

Triangular rods, experiments. *Bornemann, K. R.* Civing. 1 (1854) 186-.

## WIRES.

(See also TORSION and 3240.)

- Garcenot, E.* St. Ét. Bil. S. In. Mn. 9 (1880) 695-; 11 (1882) 827-.
- Mercadier, —.* Par. Éc. Pol. J. 58 (1888) 155-; C. R. 108 (1889) 344-.
- Searle, G. F. C.* Ph. Mg. 49 (1900) 193-.
- Wimperis, H. E.* Ph. Mg. 50 (1900) 416-.
- galvanized iron and steel, torsion and flexure. *Müller, E.* Dingler 253 (1884) 454-.
- iron (of suspension bridges), elasticity and cohesion. *Brix, A. F. W.* Dingler 66 (1837) 334-.
- , elasticity and strength. *Giulio, C. I.* Tor. Mm. Ac. 3 (1841) 275-.
- , German and Swedish. *Käs, A.* Oestr. Z. Brgw. 36 (1888) 478-, 493-.
- under strain, effect of raising to red heat. *Tomlinson, H. L.* Ps. S. P. 9 (1888) 71-; Ph. Mg. 24 (1887) 256-.

- for ropes, modulus. *Käs, A.* Oestr. Z. Brgw. 33 (1885) 853-, 373-.
- secular experiments on elasticity. *Brit. Ass., Comm.* B. A. Rp. (1879) 33-; (1880) 61-.
- , —, —. *Bottomley, J. T.* B. A. Rp. (1886) 537-.
- stretched, lateral contraction. *Götz, H., & Kurz, A.* Exner Rpm. 22 (1886) 9-, 274-, 511-; 23 (1887) 521-.
- tension. *Goumelle, E.* A. Tél. 1 (1858) 57-.
- thermal expansion and contraction under tension. *Wehage, H.* Civing. 25 (1879) 619-.
- , —, —, —. *Bottomley, J. T.* Ph. Mg. 24 (1887) 314-.
- under tension. *Bottomley, J. T.* L. Ps. S. P. 10 (1890) 184-; Ph. Mg. 28 (1889) 94-.
- , —. *Olearski, K.* Krk. Ak. (Mt.-Prz.) Rz. 1 (1891) 166-; Crc. Ac. Sc. Bil. (1890) 139-.
- variations of elasticity and internal viscosity. *Gray, A., Blyth, V. J., & Dunlop, J. S.* [1900] R. S. P. 67 (1901) 180-.
- Young's modulus and change of length by magnetisation, interference method. *Shakespear, G. A.* Ph. Mg. 47 (1899) 539-.
- for piano wire, influence of heat and electric current. *Noyes, M. C.* Ps. Rv. 2 (1895) 277-.

Zinc, elasticity at different temperatures. *Zimansky, E.* A. Ps. C. 54 (1895) 139-.

## STRENGTH OF MATERIALS, HARDNESS, FRICTION, VISCOSITY, LUBRICATION.

## 3600 General.

- Rennie, G.* Phil. Trans. (1818) 118-.
- Vicat, L. J.* A. C. 9 (1818) 303-.
- Coste, L. M. P.* J. Gén. Civ. 2 (1829) 33-.
- Barlow, P.* B. A. Rp. (1833) 93-.
- Behr, —.* Quetelet Cor. Mth. 9 (1837) 308-.
- Burg, A.* Wien Jb. Pol. I. 19 (1837) 41-; 20 (1839) 183-.
- Haupt, H.* Am. As. P. (1850) 161-.
- Haswell, C. H.* Franklin I. J. 40 (1860) 337-, 385-; 41 (1861) 37-, 108-, 183-, 242-, 314-, 404-; 42 (1861) 37-, 124-, 170-.
- Morin, A.* C. R. 54 (1862) 235-.
- Thurston, R. H.* [1873-75] (xi) Am. S. CE. T. 2 (1874) 239-; 4 (1875) 334-.
- Fraser, T. R. E.* Pp. 22 (1874) 80-.
- Shock, W. H.* Franklin I. J. 68 (1874) 84-.
- Thurston, R. H.* Am. S. CE. T. 2 (1874) 349-; 3 (1875) 1-.
- (Thurston.) *Kick, F.* Dingler 218 (1875) 185-.
- (Kick.) *Thurston, R. H.* [1875] Am. S. CE. T. 5 (1876) 9-.
- Cavalli, G.* Tor. Ac. Sc. At. 11 (1876) 684-.
- Marchat, —.* A. Cond. Pon. Chaus. 22 (1878) (Pt. 1) 65-, 80-, 100-, 107-.
- Jenny, C.* Rv. Artl. 15 (1879) 442-.



- Kent, W. V.* Nost. Eng. Mg. 20 (1879) 39-, 129-.
- Millar, W. J. I.* CE. P. 58 (1879) 222-.
- Curioni, G.* Tor. Ac. Sc. At. 16 (1880) 579-; 17 (1881) 243-; 18 (1882) 447-, 670-.
- Bauschinger, J.* Civing. 28 (1882) 561-.
- Duguet, C.* Rv. Artl. 22 (1883) 132-, 185-, 411-; 23 (1883) 21-, 115-, 318-, 498-.
- Chaudy, F.* Par. Ing. Civ. Mm. (1892) (Pt. 1) 177-.
- Application to calculation of parts of machinery.
- Léauté, H.* Par. Éc. Pol. J. Cah. 52 (1882) 201-; C. R. 94 (1882) 843-.
- engineering. *Nader, J.* Wisc. Ac. T. 2 (1874) 153-.

## BEAMS AND GIRDERS.

- T. T.* (vi Adds.) Tilloch Ph. Mg. 46 (1815) 15-, 191-.
- Baker, B. I.* CE. P. 62 (1880) 251-.
- beam-trusses, bearing capacity. *Junge, A.* Civing. 2 (1856) 79-.
- and columns. *Cousins, R. H.* Railroad & Eng. J. 63 (1889) 352.
- long and short struts. *MacCallum, J.* Glasg. T. I. Eng. 10 (1867) 229-.
- of massive section, experiments. *Kopka, —.* Civing. 17 (1871) 311-.
- practical examples, with tables. *Köpcke, C.* Hann. Z. Archt.-Vr. 3 (1857) 189-.
- problems. *Wood, D.* Franklin I. J. 45 (1863) 256-.
- theory. *Delsaux, C. A.* Cond. Pon. Chauss. 27 (1883) (1<sup>re</sup> Pt.) 145-, 271-.
- , new. *Clerc, A.* Par. Ing. Civ. Mm. (1880) (2) 111-.
- tied beams. *Anon.* (vi 609) Gleanings Sc. 2 (1830) 249-.

## BUILDING MATERIALS.

- (U.S.A.) *Stevenson, D.* Edinb. N. Ph. J. 31 (1841) 12-.
- (Cutlack.) *Rigby, —.* Beng. J. As. S. 11 (1842) 836-.
- Belpaire, A.* [*Boudin, É., & Dedier, F.*] Blg. A. Tr. Pbl. 7 (1848) 399-.
- Morin, A.* Förster Al. Bauztg. 18 (1853) 196-; 19 (1854) 194-.
- Ortmann, O.* Förster Al. Bauztg. 20 (1855) 243-.
- Roffiaen, F.* Förster Al. Bauztg. 24 (1859) 257-.
- Balme, A., & Bouscant, J.* (vii) A. Cond. Pon. Chauss. 6 (1862) 238-.
- (Venetia, tests.) *Turazza, D.* Ven. At. 7 (1861-62) 99-; 11 (1865-66) 429-.
- Seddon, (Maj.) H. C.* [1872] (xi) R. E. Pp. 22 (1874) 19-.
- (Otago.) *Blair, W. N.* [1875-76] N. Z. I. T. 8 (1876) 123-; 9 (1877) 108-.
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- Combes, C.* A. Mines 8 (1845) 517-; 9 (1846) 109-.
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- Comte, L.* A. Mines 11 (1847) 246-.
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- — — longitudinal tension. *Tredgold, T.* CE. I. T. 1 (1836) 175-.
- — — —, various substances *Navier, C. L. M. H.* A. C. 33 (1826) 225-.
- Shafts, crank-, in marine engines, causes of failure. *Milton, J. T.* Nv. Archt. T. 20 (1879) 180-.
- , steel, mysterious fractures. *Schanzer, R.* Nv. Archt. T. 42 (1900) 249-.
- Silica and amorphous substances, fracture. *Thore, J.* (xii). Dax S. Borda Bll. 3 (1878) 21-.
- Solids, deformation and conditions of rupture. *Harel de la Noé.* —. A. Pon. Chauss. (1900) (Trim. 2) 180-.
- , maximum internal tangential stress and direction of planes of rupture. *Saint-Venant, A. J. C. Barré de.* C. R. 87 (1878) 89-.
- Steel, rupture by longitudinal stress. *Carus-Wilson, C. A.* R. S. P. 49 (1891) 243-.
- Strain due to sudden cooling in glass and steel. *Barus, C., & Strouhal, V.* [1886] U. S. Gl. Sv. Bll. No. 42 (1887) 98-.
- and fracture in bars of various substances. *Millar, W. J.* Glasg. I. Eng. T. 21 (1878) 47-.
- Threads, singular case of rupture. *Elice, F.* Cattaneo G. Farm. 15 (1832) 215-, 276-.

## 3620 Permanent Set

- Threads, singular case of rupture (Elice). *Fusini*, A. A. Sc. Lomb. Ven. 2 (1832) 135-.
- , —, —, — (—), and analogous cases. *Bellavitis*, G. Poligrafo 12 (1832) 31-.

### PERMANENT SET.

- Bars of wood, iron and steel, set after transverse stress. *Norton*, W. A. Am. J. Sc. 11 (1876) 284-.
- Curves of traction. *Bouasse*, H. C. R. 128 (1899) 291-.
- Elimination, method. *Cantone*, M. Rm. R. Ac. Linc. Rd. 2 (1893) (Sem. 2) 339-.
- Glass, deformation, and change of zero of thermometers. *Marchis*, L. Bordeaux S. Sc. Mm. 4 (1898) 1-.
- Iron, annealed and unannealed, effect of prolonged strain. *Thurston*, R. H. Science 1 (\*1883) 418-.
- , cast, mobility of molecules. *Outerbridge*, A. E. (jun.) [1896] Am. I. Mn. E. T. 26 (1897) 176-.
- , effect of continued and progressively increasing strain. *Huston*, C. [1878] Franklin I. J. 77 (1879) 41-.
- , molecular changes due to repeated torsion. *Burg*, A. Wien SB. (1851) 149-.
- , —, —, — use. *François*, J. C. R. 14 (1842) 796-.
- Isotropic spheres, local alteration of material under normal pressure. *Chree*, C. Ph. Mg. 38 (1894) 161-.
- Metals, effect of continued percussion on relative position of particles. *Hayes*, A. A. Am. Ac. P. 3 (1852-57) 322-.
- , elongation after rupture. *Barba*, J. Par. Ing. Civ. Mm. (1880) (1) 682-.
- , molecular changes in. *Thurston*, R. H. Franklin I. J. 69 (1875) 441-.
- , —, —. *Spangenberg*, —. D. Nf. B. (\*1877) 119-.
- , permanent deformations. *Faurie*, G. A. C. R. 124 (1897) 1510-.
- , —. *Brillouin*, M. A. C. 13 (1898) 377-; 14 (1898) 311-.
- , —, accompanying phenomena. *Hartmann*, —. St. Ét. Bil. S. In. Mn. 14 (1900) (Cg. Int. Mines) 1659-.
- , —, influence of time. *Charpy*, G. Par. S. Ps. Sé. (1898) 27\*.
- , —, and limits of elasticity. *Brillouin*, M. A. C. 15 (1898) 447-.
- , —, —, rupture. *Faurie*, G. A. C. R. 126 (1898) 400-.
- Solids, permanent deformations and rupture. *Faurie*, G. A. C. R. 121 (1895) 343-.
- Tension by loading, change of density due to. *Grunmach*, L. [1898] A. Ps. C. 67 (1899) 227-.
- Wires. *Lenoble*, —. Bordeaux S. Sc. PV. (1897-98) 74-; *Brux*, S. Sc. A. 22 (1898) (Pt. 1) 52-; *J. de Ps.* 9 (1900) 532-.
- , hard-drawn, effect of elongation on cross section. *Gray*, T., & *Mees*, C. L. Ph. Mg. 29 (1890) 355-.

## After-strain 3630

- Wires, molecular forces in. *Miller*, A. Münch. Ak. Sb. 15 (1886) 9-.
- in wire-rope. *Wabner*, R. Berg-Hm. Ztg. 49 (1890) 181-, 209-, 217-.
- Wood, pressure, effect. *Reusch*, E. Würtb. Jh. 25 (1869) 35-.

## 3630 After-strain. Alternating Stress. Repeated Loading. Fatigue of elasticity. (See also 3220 Vibrations, Wires.)

### AFTER-STRAIN.

- Kohlrausch*, F. A. Ps. C. 128 (1866) 1-, 207-, 399-.
- Boltzmann*, L. Wien Ak. Sb. 70 (1874) (Ab. 2) 275-.
- Meyer*, O. E. A. Ps. C. 151 (1874) 108-.
- Kohlrausch*, F. Gött. Nr. (1875) 41-.
- Neesen*, F. A. Ps. C. 157 (1876) 579-.
- Kohlrausch*, F. A. Ps. C. 158 (1876) 337-.
- Braun*, F. A. Ps. C. 159 (1876) 337-.
- Boltzmann*, L. [1877] Wien Ak. Sb. 76 (Ab. 2) (1878) 815-.
- Meyer*, O. E. A. Ps. C. 4 (1878) 249-.
- Warburg*, E. [1878] Freiburg B. 7 (1880) 225-.
- Streintz*, H. [1879] Wien Ak. Sb. 80 (1880) (Ab. 2) 397-.
- Gezekhus* [Hesekhus], N. A. (xii) Rs. Ps.-C. S. J. 14 (Ps.) (1882) [Pt. 1] 287-; (x) A. Ps. C. Beil. 7 (1883) 654-.
- Michaelis*, G. J. A. Ps. C. 17 (1882) 726-; *Amst. Ak. Vs. M.* 20 (1884) 300-; *Fschr. Ps.* (1884) (Ab. 1) 408-.
- Sebuev*, G. Kazan S. Nt. (Ps.-Mth.) P. 7 (1889) 241-; *Fschr. Ps.* (1889) (Ab. 1) 422-.
- Lamb*, H. Nt. 41 (1890) 463.
- Boltzmann's theory*. *Kohlrausch*, F. [1876] A. Ps. C. 160 (1877) 225-.
- , —. *Riecke*, C. V. E. Gött. Nr. (1883) 162-.
- Experiments, and rupture of prism of Bessemer steel twisted and untwisted. *Pérard*, L. Cuyper Rv. Un. 7 (1880) 486-.
- Flexure, action in. *Messer*, H. [1879] Freiburg B. 7 (1880) 364-.
- Glass, after-strain in. *Klemenčič*, I. [1878] Wien Ak. Sb. 78 (1879) (Ab. 2) 481-.
- , —, — and chemical composition. *Sherman*, O. T. Am. J. Sc. 29 (1885) 385-.
- , —, —, torsional, of fibre. *Hopkinson*, J. [1878] R. S. P. 28 (1879) 148-.
- Longitudinal after-strain, experiments. *Neesen*, F. A. Ps. C. 7 (1879) 460-.
- and torsional after-strain in metals. *Austin*, L. A. Ps. C. 50 (1893) 659-.
- Method of observation. *Warburg*, —. D. Nf. Tbl. (\*1876) (Beil.) 68.
- Temperature, constant, laws for. *Wiechert*, E. A. Ps. C. 50 (1893) 335-, 546-.
- , influence. *Schröder*, T. A. Ps. C. 28 (1886) 369-.
- Torsional after-strain. *Kohlrausch*, R. Pogg. A. 119 (1863) 337-.



- Torsional after-strain. *Neesen, F.* A. Ps. C. 153 (1874) 498-; Berl. Ak. Mb. (1874) 141-.
- — — (Neesen). *Kohlrausch, F.* A. Ps. C. 155 (1875) 579-.
- — —. *Bouasse, H.* J. de Ps. 8 (1899) 241-.
- Vibrations of strings, effect of after-strain. *Šebuev, G. N.* Kazan S. Nt. (*Ps.-Mth.*) P. 7 (1889) 374-.
- Wires, action in. *Braun, W., & Kurz, A.* Carl Rpm. 18 (1882) 665-.
- — — (Braun and Kurz). *Tammen, —.* Exner Rpm. 20 (1884) 413-.
- — —. *Kurz, A.* Exner Rpm. 20 (1884) 856-.
- — —, steel, action in torsion. *Finger, J.* [1875] Wien Ak. Sb. 72 (1876) (*Ab.* 2) 257-.

## ALTERNATING STRESS.

- Vibrations of connecting rods. *Résal, H.* A. Mines 9 (1856) 233-.
- — — screw steamers, and cure. *Brauer, —.* [1897] Karlsruhe Nt. Vr. Vh. 13 (1900) (*Sb.*) 120.
- — — ships. *Schlick, O.* Nv. Archt. T. 25 (1884) 29-; 35 (1894) 350-.
- — — and engines. *Mallock, A.* Nv. Archt. T. 36 (1895) 296-.
- — — — —, methods of diminishing. *Nor-mand, A.* C. R. 113 (1894) 701-.
- — — — —, prevention. *Robinson, M., & Sankey, (Capt.) H. R.* Nv. Archt. T. 36 (1895) 309-.
- — — — —, higher order, and torsional vibrations. *Schlick, O.* Nv. Archt. T. 36 (1895) 287-.
- — —, sympathetic, in machinery. *Lovering, J.* Am. As. P. 21 (1872) 59-.
- Wöhler's experiments. *Pearson, K.* Mess. Mth. 20 (1891) 21-.
- — —, determination of coefficients of specific effort by. *Clericetti, C.* Cuyper Rv. Un. 11 (1882) 596-; Mil. I. Lomb. Rd. 13 (1883) 501-.
- — — laws. *Gilchrist, J.* [1900] Sc. Abs. 4 (1901) 219.

## FATIGUE OF ELASTICITY.

- Peddie, W.* [1900] Edinb. R. S. P. 23 (1902) 90.
- Beams, resistance to strain beyond elastic limit. *Broune, W. R.* B. A. Rp. (1883) 648-.
- — —, small spruce, fatigue. *Kidder, F. E.* Am. Ac. P. 17 (1882) 304-.
- Copper and silver, patience as affected by annealing. *Howe, H. M.* Am. I. Mn. E. T. 13 (1885) 646-.
- Elasticity and fatigue. *Landis, H. K.* Am. Eng. & Railroad J. 71 (1897) 160-, 196-.
- — — — —, in rotary pumping engines. *Dechamps, H., & Henrotte, J.* Rv. Un. Mines 5 (1889) 243-.
- — — — —, of stretching. *Thompson, J. O.* Ps. Rv. 1 (1894) 346-.
- Glass, secular changes in. *Barus, C.* Am. J. Sc. 9 (1900) 139-.

- Iron, change of mechanical properties by use. *Bauschinger, J.* Dingler 235 (1880) 169-.
- — — and steel. *Gautier, F.* Gén. Civ. 1 (\*1880-81) 305-.
- Longitudinal and torsional elastic fatigue. *Austin, L. W.* Ps. Rv. 1 (1894) 401-.
- Metals, fatigue and deterioration. *Zinn, W. A.* Elect. Rv. 43 (1898) 363-.
- — — under long continued strain, rate of set. *Thurston, R. H.* [1876] Am. S. CE. T. 6 (1878) 28-.
- — — — — stress, effects. *Bottomley, J. T.* R. S. P. 29 (1879) 221-.
- — —, permanent effects of strain. *Thurston, R. H.* Am. S. CE. T. 24 (1891) 159-; 25 (1891) 17-.
- Minimum of maximum fatigue of uniformly loaded prism, arrangement of supports corresponding to. *Derote, L.* Brux. Ac. Bil. 18 (1864) 455-.
- Steel, Bessemer, mechanical changes in. *MacMartin, A.* Am. I. Mn. E. T. 2 (\*1873-74) 300-.
- — —, "fatigued," micro-structure. *Andrews, T.* [1897] Nt. 57 (1897-98) 58.
- — —, loss of strength due to use. *Andrews, T.* Nt. 55 (1896-97) 418.
- Torsion prolonged beyond limit of elasticity. *Tresca, H.* A. Gén. Civ. 1 (1872) 647-.
- Wires under constant tension, spontaneous elongation. *Duhem, P.* Bordeaux S. Sc. PV. (1898-99) 90-.
- — —, copper, "sag." *Herzog, J.* Elekttech. Z. 15 (1894) 437-.
- — —, iron, progressive elongation under various tensions. *Vicat, L. J.* A. C. 54 (1833) 35-.
- — —, losses of energy by torsion. *Bouasse, H.* A. C. 14 (1898) 106-.
- — —, vibrating, period of logarithmic decrement. *Thompson, J. O.* Ps. Rv. 8 (1899) 141-.
- — — — — (Thompson). *Peddie, W.* Edinb. R. S. P. 22 (1900) 598-.
- Wrought iron and steel forgings, fatigue in. *Porter, H. F. J.* Franklin I. J. 145 (1898) 241-, 321-.

## REPEATED LOADING.

- Dimensions and safe loads, calculation. *Khernul, A.* Civing. 25 (1879) 293-.
- Elastic accommodation. *Cantone, M.* Rm. R. Ac. Linc. Rd. 2 (1893) (*Sem.* 2) 385-.
- Girders, wrought-iron, effect of repeated loading, vibratory action, etc. *Fairbairn, W. B.* A. Rp. (1860) 45-; (1861) 286-; Phil. Trans. 154 (1864) 311-.
- Lattice bridge, fatigue, actual and calculated. *Mesnager, —.* A. Pon. Chauss. (1899) (*Trim.* 2) 223-.
- Metals, law of fatigue and refreshment. *Egleston, T.* Am. I. Mn. E. T. 8 (\*1880) 398-.
- — — under repeated strains. *Spangenberg, L.* Z. Bauw. 24 (1874) 473-; 25 (1875) 77-.
- Overstrain in iron, etc., method of detecting; application to bridge accidents, etc. *Thurston, R. H.* Am. S. CE. T. 7 (1878) 53-.

- Overstrain in iron, recovery from. *Muir, J.* [1899] *Phil. Trans. (A)* 193 (1900) 1-.
- Steel bars, endurance under repeated tensional stress. *Coker, E. G.* *I. CE. P.* 135 (1899) 294-.
- Strength of materials, effect on. *Merriman, M. V.* *Nost. Eng. Mg.* 32 (1885) 96-.

### 3640 Hardness. Friction between solids. Abrasion.

#### ABRASION.

- Attrition, laws. *Trouton, F. T. R. S. P.* 59 (1896) 25-.
- Carborundum, new abrasive material. *Franklin Inst., Comm.* Franklin I. J. 137 (1894) 401-.
- Coefficient of abrasion as absolute measure of hardness. *Trouton, F. T. B. A. Rp.* (1890) 757-.
- Corundum, efficiency. *Emerson, W. H.* [1899] *Am. I. Mn. E. T.* 29 (1900) 230-.
- Emery and other abrasives. *Paret, T. D.* Franklin I. J. 137 (1894) 353-, 421-.
- Fine sands, action of waves, evidence of Skerries shoal. *Hunt, A. R.* *Devon. As.* T. 19 (1887) 498-.
- Garnet as abrasive. *Hooper, F. C.* *Sch. Mines Q. N. Y.* 16 (1895) 124-.
- Gun barrels, action of powder products. *Abel, (Sir) F., & Maitland, (Col.)* —. *I. & S. I. J.* (1886) 465-.
- tubes, steel, action of projectiles and explosives. *Roberts-Austen, W. C. I. & S. I. J.* (1898) (No. 2) 233-.
- , use of liners in. *Longridge, J. A.* *I. CE.* P. 109 (1892) 288-.
- Iron and steel, abrasion tests. *Pomeroy, L. R., & Price, C. S.* *Am. Eng. & Railroad J.* 70 (1896) 322-.
- Planing, force and work in. *Afanasjeff, N.* *Fachr. Ps.* (1884) (Ab. 1) 273-.
- machines, performance. *Exner, W. F., & Lauböck, G.* *Civing.* 26 (1880) 287-.
- of metals. *Tresca, H.* *C. R.* 73 (1871) 1307-.
- , formation of chips in. *Judenfeind-Hülse, G. H.* *Civing.* 23 (1877) 615-.
- Road wear. *Gravenhorst, F.* *Hann. Archt.-Vr. Z.* 33 (1887) 409-; 43 (1897) 423-.
- , various causes. *Ortt, F. L.* 's *Gravenh. I. Ing. Ts.* (1893-94) (Vh.) 15-.
- Roads and road metalling. *Clark, T.* *Cornwall Pol. S. Rp.* (1886) 103-.
- Saw, curvilinear. *Trotter, J.* *Nicholson J.* 17 (1807) 334-.
- Sawing, experiments. *Regneault, E. E.* *Nancy Mm. S. Sc.* (1839) 128-.
- Tree trunks, peculiar abrasion. *Van Epps, P. M.* *Science* 3 (1896) 442-.

#### BORING.

- Thomson, J.* Franklin I. J. 17 (1849) 68-.
- Mackworth, H.* *N. Eng. I. Mn. E. T.* 2 (1853-54) 57-.
- Lippmann, É.* *Par. Ing. Civ. Mm.* (1878) 817-.

#### Apparatus.

- Héricart de Thury, L. É. F.* *J. Mines* 31 (1812) 401-.
- Degoussé, J. A.* *Mines* 14 (1838) 315-.
- Lefébvre, —.* *A. Mines* 15 (1839) 455-.
- Degoussé, J. A.* *Mines* 19 (1841) 593-.
- Oeynhausen, K.* *Karsten Arch.* 21 (1847) 135-.
- for borings by direct pressure. *Allen, T.* [1872] (vii) *Am. S. CE. T.* 2 (1874) 33-.
- drills, best form. *Seckendorf, W. von.* *Cuyper Rv. Un.* 12 (1862) 198-.
- , diamond. *Basset, A. N.* *Eng. I. Mn. E.* T. 23 (1874) 179-.
- , — prospecting core. *Rogers, S.* *Cornwall R. I. J.* 11 (1895) 378-.
- for granite, etc. *Tresidder, J.* *Cornwall Pol. S. T.* (1852) 97-.
- rock boring engines. *Schrader, —.* *Z. Berg-H. Salw.* 41 (1893) (Ab.) 110-.
- , —, Brunton's. *Biver, —.* *C. R.* 91 (1880) 525-.
- , —, calculations. *Pregél, —.* *Dingler* 273 (1889) 114-.
- drills, compressed air, and other. *Sachs, C.* *Cuyper Rv. Un.* 19 (1866) 392-.
- rods, improved boring-head for. *Fabian, —.* *Karsten Arch.* 22 (1848) 206-.
- , mud-lifter for. *Degenhardt, C.* *Karsten Arch.* 7 (1834) 185-.
- for very deep borings. *Le Play, F. A.* *Mines* 15 (1839) 447-.
- for rope-drilling, new. *Sontag, H.* *Berg-Hm. Ztg.* 28 (1869) 5-.
- , —, Urals. *Erman, A.* *Erman Arch.* Rs. 12 (1853) 335-.
- Ryan's machine. *Edgeworth, R. L.* *Nicholson J.* 15 (1806) 81-.
- verifying instrument. *Baillet, A. J.* *Mines* 10 (1801) 567-.

#### Artesian Wells.

- Audiganne, —.* *Blg. S. Ag. J.* 4 (1857) 350-.
- boring and action. *Kastner, K. W. G.* *Kastner Arch. Ntl.* 18 (1829) 466-.
- , Fontainebleau. *Héricart-Ferrand (vicomte de Thury), L. É. F.* (xii) *Fr. S. Ag. Mm.* (1819) 323-.
- , Lozère (France). *Ignon, A.* *Mende S. Ag. Mm.* (1830) 202-.
- method, new. *Hammerschmidt, C. E. D.* *Nf. Vsm. B.* (1836) 65-.
- methods, Vienna. *Camilla, —.* *Baumgartner Z.* 9 (1831) 475-.
- , Mondorf, and Kind's improvements. *Rivot, L. E. A.* *Mines* 8 (1845) 75-.
- , Tuticorin (Madras). *Anon.* (vi) 777)
- Madras J. 15 (1848) 167-.
- machinery, etc. *Burnell, G. R.* (vi *Adds.*) *CE. I. P.* 23 (1863-64) 459-.
- theory and practice. *Jebb, J.* [1841] *R. E.* Pp. 5 (1842) 266-.

- Blast-holes. *Havrez, J.* *Cuyper Rv. Un.* 39 (1876) 489-; 6 (1879) 293-.
- Bore-holes, wide. *Heyn, —.* *Karsten Arch. Bergbau* 8 (1824) 91-.

*Boring and Shaft-sinking through Water-bearing Strata.*

- Baur*, —. *Karsten Arch.* 7 (1834) 174-.
- Burat*, A. A. *Mines* 14 (1848) 399-.
- Rousseau*, C. A. *Gén. Civ.* 2 (1863) 123-.
- apparatus. *Busby*, J. *Highl. S. T.* 6 (1824) 611-.
- boring for salt solutions, Köttschau. *Hülse*, —. *Karsten Arch.* 1 (1829) 400-.
- water, London and environs. *Donkin*, J. *CE. I. T.* 1 (1836) 155-.
- "Kind" process, Belgium. *Chaudron*, J. A. *Mines* 18 (1860) 435-.
- method of tubing. *Reid*, P. S. *N. Eng. I. Mn. E. T.* 10 (1861) 199-.
- through quicksands. *Bouhy*, V. A. *Mines* 17 (1850) 407-.
- on sea-beach, Madras. *Taylor*, T. G. *Madras J.* 14 (1847) 183-.
- subaqueous boring. *Hime*, F. *R. E. Pp.* 23 (1876) 13-.
- , compressed air apparatus for mine-shafts. *Triger*, —. *C. R.* 13 (1841) 884-.
- Methods. *Fantet*, —. A. *Mines* 3 (1833) 179-.
- 375-.
- *Anon.* (xi 70) *Rv. Sc.* 5 (1841) 25-; 6 (1841) 339-.
- and apparatus, deep boring, Northampton. *Eunson*, H. J. *I. CE. P.* 74 (1883) 270-.
- , Lempdes (Haute-Loire). *Baudin*, —. A. *Mines* 14 (1848) 233-.
- for small depths. *Lippmann*, É. A. *Gén. Civ.* 8 (1879) 837-; 9 (1880) 1-.
- , coal-mines, Cavaillac (Gard). *Hamon*, —. A. *Mines* 7 (1835) 303-.
- , new system. *Fauvelle*, —. A. C. 18 (1846) 328-.
- , Sardon (Rire-de-Gier). *Girard*, —, & *Leseure*, —. *St. Ét. Bil. S. In. Mn.* 11 (1865-66) 241-.
- Mineral salts, method of obtaining solid samples. *Nettekoven*, A. *Z. Berg. H. Salw.* 31 (1883) (Ab.) 429-.
- Rock boring, application of heat to. *Daubrée*, A. A. *Mines* 19 (1861) 23-.
- , diamond. *Bewick*, T. J. *N. Eng. I. Mn. E. T.* 30 (1881) 93-.
- engines, experiments, Levant du Flénu (Belgium). *Mativa*, H. *Cuyper Rv. Un.* 3 (1878) 652-.
- , use. *Biver*, —. *C. R.* 91 (1880) 830-.
- Rope-drilling. *Sello*, —. *Karsten Arch.* 6 (1833) 343-; 7 (1834) 526; 9 (1836) 377-.
- *Gruner*, E. L. A. *Mines* 8 (1835) 317-.
- Shaft-sinking. *Francy*, —. A. *Mines* 2 (1852) 227-.
- *Huyssen*, A. *Karsten Arch.* 26 (1854) 65-.
- *Schernthaner*, A. *Wien Berg. Hm. Jb.* 31 (1883) 225-.
- for fire-damp bearing strata. *Eckardt*, —. *Z. Berg. H. Salw. (Ab.)* 13 (1865) 54-.
- Useful resistance produced in. *Coquillhat*, —. *Brux. A. Tr. Pbl.* 10 (1851-52) 199-.

- Cutting tools, action. *Mallock*, A. [1881] *R. S. P.* 33 (1882) 127-.
- Felted cloth. *Bourcier*, J. *Lyon S. Ag. A.* 4 (1841) 574-.
- Felting and fibres with felting property. *Alcan*, M. *Par. A. Cons.* 6 (1866) 268-.
- , mechanism. *Monge*, G. A. C. 6 (1790) 300-; *Hermstädt Ms.* 2 (1814) 379-.
- power, cause. *Broune*, P. A. *Franklin I. J.* 20 (1850) 205-.
- Fibres of wood, slipping on one another, and resistance to shear. *Hochereau*, A. *Brux. A. Tr. Pbl.* 41 (1884) 19-.

## FRICTION BETWEEN SOLIDS.

(See also 3670.)

- Burrow*, R. *As. Researches* 1 (1788) 171-.
- Tredgold*, T. *Tilloch Ph. Mg.* 53 (1819) 3-; 54 (1819) 19-; 293-.
- Coste*, L. M. P. *J. Gén. Civ.* 7 (1830) 520-.
- Lamarle*, E. *Par. A. Pon. Chauss.* 7 (1884) 33-.
- Bellavitis*, G. [1847] *Ven. Mm. I.* 4 (1852) 213-.
- Sella*, Q. *N. Cim.* 13 (1861) 230-.
- Dyer*, J. C. *Manch. Lt. Ph. S. P.* 3 (1864) 245-.
- Dorna*, A. *G. Mt.* 3 (1865) 202-.
- Folie*, F. *Brux. Ac. Bil.* 29 (1870) 168-.
- Tilly*, J. M. de. [1870] *Brux. Mm. Cour.* 8°, 22 (1872) (No. 2) 32 pp.
- Vallès*, F. A. *Pon. Chauss.* 20 (1870) 404-.
- Conti*, P. [1874] *Rm. R. Ac. Linc. At.* 2 (1875) 16-.
- (Conti.) *Cremona*, L. *Rm. R. Ac. Linc. At.* 2 (1875) 3-.
- (—) *Richelmy*, P. *Tor. Ac. Sc. At.* 10 (1875) 773-.
- (Richelmy.) *Conti*, P. *Tor. Ac. Sc. At.* 11 (1876) 630-.
- (Conti.) *Richelmy*, P. *Tor. Ac. Sc. At.* 11 (1876) 663-.
- Kimball*, A. S. *Am. J. Sc.* 13 (1877) 353-.
- Thurston*, R. H. *Am. As. P.* (1878) 61-.
- Zeuthen*, H. G. *Ts. Mth.* 4 (1886) 168-; *Fschr. Ps.* (1886) (Ab. 1) 322.
- Weilenmann*, A. *Zür. Vjschr.* 35 (1890) 302-.
- König*, W. *Frkf. a. M. Ps. Vr. Jbr.* (1892-93) 23-.
- Pennacchiotti*, G. *Palermo Cir. Mt. Rd.* 7 (1893) 256-.
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- , —, —, —. *Crosby*, O. T. *Tel. J.* 26 (1890) 460-.
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